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Office of Pollution Prevention
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User's Manual for RSEI Version 2.0 Beta 2.0 [1988-1999 TRI Data]

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Economics, Exposure, and Technology Division
Office of Pollution Prevention and Toxics
United States Environmental Protection Agency

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WELCOME TO EPA'S RISK-SCREENING ENVIRONMENTAL INDICATORS CD-ROM

EPA's Risk-Screening Environmental Indicators (RSEI) model permits full risk-related modeling for air (stack and fugitive) releases and surface water releases (from TRI reporting facilities and POTWs) only . However, all releases and transfers reported to TRI can be viewed from a hazard-based perspective, i.e., pounds released can be weighted by the toxicity of the chemical. For releases to media other than air that can be modeled by the Indicators model, the user can view pounds weighted by toxicity and population as well. Although this User's Manual describes some functions that are not implemented in the air and surface water only model, it also provides instruction specific to the use of the current version.

In addition to caveats listed throughout the User's Manual, there are several things to consider when running the current version of the model:

- When installing the Indicators model, please make sure that you sign off of your computer network (e.g., the Novell network), so that the model will be properly installed onto your computer's hard drive

- Because the current version of the model is restricted to the air and surface water modeling results, the full risk-related model results are available only for on-site fugitive and stack air releases and direct surface water releases; full model results based on releases to other media (e.g., releases to groundwater) are not available. However, with this version of the model you will be able to look at TRI pounds, modeled pounds, hazard ranking, and subcomponents of the full risk-related model results, e.g., (pounds x toxicity) and (pounds x toxicity x population) for all media.

- If you have a computer with limited memory, please be aware that when using the model, it may be difficult to use other computer applications at the same time. (Windows 95 and later operating systems allow multi-tasking.)

- The model uses TRI release and transfer information for the time period from 1988 to 1999.

- On-line Help Screens are available in the model, and present much of the information contained in this User's Manual.

- New users are encouraged to begin with the Easy RSEI interface, which provides quick and easy results with no experience required. The Tutorials provided in Chapter 3 of this manual are also a helpful introduction to the functions in the Advanced RSEI interface.

We would appreciate your comments and suggestions on how this User's Manual may be improved upon to aid you, the user. Thank You.

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For More Information...

Supporting analyses for the RSEI model are available in PDF format on the model website at www.epa.gov/oppt/env_ind. The RSEI Methodology document, which describes in detail the algorithms used in the model, as well as the data inputs used, is also posted on the website. Since the RSEI model is continuously being updated and revised, check the website for updates and additional analyses.

In addition, several technical appendices are provided. These appendices provide detailed information on toxicity data, physicochemical data, exposure assumptions, locating facilities, stack parameter data, chemical flag fields, and the differences between the data used by TRI's Public Data Release and RSEI. The technical appendices, along with the Adobe Acrobat (PDF) version of this User's Manual, and a spreadsheet containing the toxicity data used in the model, can all be found on the RSEI Installation Disk #2.

Online help is also available through the model interface itself.

Please Note:

Note that RSEI results that include POTW releases from Lamar County in Texas will be skewed by an erroneous report from a facility. This facility reported (in error) a transfer of lead to a POTW when in fact, the lead was transferred to a recycling facility. The reporting facility has been contacted and is submitting a correction. However, the score is included in this version of RSEI. This may not be the only erroneous report, but this release warrants a special note because of its magnitude: approximately 17% of the risk-related score for all media in 1999. This is a good example of why it is necessary to follow up on RSEI results.

INSTALLATION INSTRUCTIONS FOR EPA'S RISK-SCREENING ENVIRONMENTAL INDICATORS CD-ROM

System Requirements

To install and run the RSEI model requires approximately 2 gigabytes of free hard disk space. At least 128 Mbytes of RAM is recommended. Users must also have Internet Explorer Versions 3.0 or later installed on their computer to use the RSEI Help feature.

It is important to remove any previous versions of the Risk-Screening Environmental Indicators model from your hard drive before you install this version. Instructions on uninstalling the program are in the **Uninstall** section below.

These instructions assume you are using Windows 95, 98, NT or 2000. This version of the model will not work on earlier operating systems, such as Windows 3.1. Please note that to install using Windows XP, you must be logged on as an administrator.

Previous versions of the RSEI model could be run from the CD without an installation on the user's hard drive. For Version 2.0, extensive data enhancements have increased the size of the databases so that running from a CD is no longer possible, and all users must perform the full hard drive installation. Please note that to ensure proper installation, the full hard drive installation must be performed on the C:\ drive which must contain adequate memory and available disk space to accommodate the program.

Installing RSEI

1. Close all Programs and put the Indicators Installation Disk #1 in the CD-ROM drive.

2. The Installation Disk should begin the installation automatically. If it does not, click on the Start button at the bottom left of your screen then 'Run.' In the space after 'Open:' type in 'D:\setup.exe'. Substitute the appropriate letter if your CD-ROM drive is labeled other than 'D.' Click 'OK.'

3. Follow the prompts in the installation process. Insert Disk #2 when prompted. Depending on the speed of your computer, installation may take up to 15 minutes.

Launching RSEI

When the installation is complete, the install wizard will ask if you want to launch the program. Click 'Yes,' and the **RSEI** interface will launch. Here, you can click on **Easy RSEI**, which is a simplified mode of operation that provides users with rankings and trend analyses at the level of the whole nation, an EPA region, or a single state. Easy RSEI is a quick and simple way to access some of the most commonly-used data in RSEI. It is also a great introduction to the kinds of information RSEI can provide. After the first launch, you can access Easy RSEI again by clicking the Start button at the bottom left corner of your Windows screen, then 'Programs,' 'EPA RSEI,' then 'RSEI.'

When you are ready, you can try **Advanced RSEI**. A good introduction to the many functions in Advanced RSEI is the three RSEI Tutorials. They can be found in Chapter 3 of this manual, or by clicking on the RSEI Tutorial button on the RSEI start screen. When you want try the Advanced RSEI yourself, click on the 'Advanced RSEI' button on the RSEI start page. The model will then display 'Important Characteristics of RSEI.' Click 'Continue,' and the **Advanced RSEI** interface will open. Advanced RSEI allows users unlimited freedom to customize their use of RSEI using maps, crosstab tables, sorted tables, filters, and graphs. Users can look at national-level results or the results for a single facility or chemical. Extensive help is available by clicking the Help button at any point in the model, or in Chapters 4 through 9 of this Manual. Once you're comfortable with Advanced RSEI, click on the button in the bottom left of the Easy RSEI start page that says, 'In the future, start Advanced RSEI.' Then you can access the RSEI Advanced mode by clicking the Start button at the bottom left corner of your Windows screen, then 'Programs,' 'EPA RSEI,' then 'RSEI.' Advanced RSEI will automatically open. If you ever want to go back to Easy RSEI or the tutorials, simply delete the file called 'rseiintf.cfg' in your C:\Program Files\RSEI directory, and the original RSEI start page with the Easy RSEI and RSEI Tutorials buttons will open.

Note that the way the RSEI model appears on your screen will depend on your Windows settings, including your screen resolution. If some of the displays appear truncated, click on the Windows 'Start' button, then 'Settings,' then 'Control Panel,' then 'Display,' then 'Settings.' In the right-hand side of the screen, slide the levers under 'Display area' to the right one notch.

Uninstalling RSEI

This will remove the entire program, ancillary files (*.dll's), accompanying databases, and queries, including any queries that you have run yourself. It will not uninstall the IDAPI folder. You do not need the CD-ROM to do this.

1. Click on Start->Control Panel->Add/Remove Programs.

2. In the list that appears, click on RSEI, then 'Add/Remove.'

3. The program will ask you if you are sure you want to remove the program. Click 'Yes.' Follow the prompts to remove the Indicators model.

4. You may need to manually delete the C:\Program Files\RSEI folder and its subdirectories. Do this by using Windows Explorer, open the view of the C: drive and dragging the C:\Program Files\RSEI folder into the Recycle Bin. The disk space will not be freed up until you empty the Recycle Bin.

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CHAPTER 1
Introduction to EPA's Risk-Screening Environmental Indicators

Each year the Toxics Release Inventory (TRI) provides the public with detailed data on releases and transfers for a large set of chemicals emitted by selected facilities in the United States.[1] To track the potential risk-related impacts of these chemical releases and transfers, the Environmental Protection Agency (EPA) has developed the Risk-Screening Environmental Indicators (RSEI), a computer-based (Microsoft Windows) model that permits screening-level analyses using TRI data. The RSEI model supplements a quantity-based ("pounds only") view of releases by incorporating information and models that assess, at a screening-level, the risk-related trends of chemical releases. The information and models enable the user to consider the toxicity of chemicals, the quantity of chemical to which people are exposed, and the size of the population exposed to those chemicals. It should be emphasized that the result is *not* a detailed or quantitative risk assessment, *but offers a screening-level, risk-related perspective for relative comparisons of chemical releases*. The model also allows users to examine results from a hazard-based perspective, i.e., one where TRI releases (in pounds) are weighted by the toxicity of the chemical being released. This is especially useful when examining releases and transfers in the absence of exposure modeling and information.

Tracking changes in environmental health impacts over time using the RSEI model allows EPA to measure its progress in implementing environmental protection and pollution prevention programs. In addition, comparing risk-related impacts of particular chemicals, industries, and geographic regions through the RSEI model allows EPA and other users to establish priorities for improving future environmental health.

EPA envisions a set of four indicators that would separately track the following: (1) chronic human health, (2) acute human health, (3) chronic ecological and (4) acute ecological impacts. The first Indicator to be developed is the Chronic Human Health Indicator. An Indicator of chronic ecological impacts is being considered, and may be available in the future. The

[1] Prior to 1998, TRI only required reports from manufacturing facilities (SIC codes 2000-3999). Beginning with Reporting Year 1998, selected facilities in other SIC codes (including electric utilities, mining, and chemical wholesaling) are also required to report. See Chapter 9 for details on the relevant SIC codes.

development of corresponding acute effects indicators is not feasible now, since the data to support such indicators are not available.[2]

The RSEI model currently implements only the Chronic Human Health Indicator, which addresses both chronic effects and chronic exposures. Chronic effects are those that generally persist over a long period of time whether they occur immediately after exposure or are delayed. Chronic exposure refers to multiple exposures occurring over an extended period of time, or a significant fraction of an individual's lifetime.

The following sections of this chapter (Chapter 1) describe the RSEI method and the types of questions that can be explored using the model. Chapter 2 describes the changes that can be found in Version 2.0. Chapter 3 provides three tutorials that will help the new user get started with commonly-used functions. Chapters 4 through 8 describe the operations of the advanced mode of the computer model. Chapter 9 provides additional information that may be useful when querying the database, including SIC codes, score category codes, FIPS codes, and other TRI codes, and a glossary. This Manual is supplemented by Technical Appendices that can be found on Disk #2 of the RSEI Installation Disk. The appendices present additional information on the following topics: toxicity (Appendix A) and physicochemical data (Appendix B) for TRI chemicals, exposure assumptions used in the model (Appendix C), locational data for onsite and offsite facilities (Appendix D), derived stack parameter data (Appendix E), chemical flag fields (Appendix F), and the RSEI Model (Appendix G). Install Disk #2 also contains a spreadsheet detailing the calculation of the chemical toxicity weights used in the model.

Model Description

The RSEI model calculates values that reflect the risk-related impacts on chronic human health of modeled TRI releases and transfers for a given year or years. These values do not provide absolute measures of risk and can only be interpreted as relative measures to be compared with other such values (reflecting the direction and the general magnitude of changes at different points in time when analyzing trends, or identifying the relative contribution of variables in an analysis). In this way, the RSEI model is able to rank in a relative manner the "risk-related impacts" on non-worker populations chronically exposed to any chemical that can be modeled.

[2] To appropriately evaluate potential acute effects, one would need to know the distribution of releases over time (peak release data), and these data are not currently reported through the TRI.

The RSEI model uses the reported quantities of TRI releases and transfers of chemicals to estimate the risk-related impacts associated with each type of release or transfer by every TRI facility. These scores are only meaningful in relationship to one another. The risk-related impacts potentially posed by a chemical are related to chemical toxicity, the fate and transport of the chemical in the environment after it is released, the pathway of human exposure, and the number of people exposed.[3] These components are discussed further below.

The RSEI model uses these components to derive a unique value corresponding to each combination of a facility, chemical, and release or transfer pathway (i.e., a chemical-facility-pathway-specific value is generated). For instance, a release of the chemical benzene from the 'ABC' Facility that is released to the air via a stack is an 'Indicator Element.' An "Indicator Element," is a unitless value proportional to the potential risk-related impact of each specific release or transfer. Indicator elements can be summed over all TRI releases and transfers for each year, to allow an assessment of the trends in estimated risk-related impacts of TRI releases and transfers. Indicator Elements can also be combined in numerous ways to allow users to compare the risk-related results for facilities, regions, chemicals, and any combinations of these and other variables. The results are *not* a detailed or quantitative risk assessment, *but offer a screening-level, risk-related perspective for relative comparisons of chemical releases*.

In addition, RSEI allows users to look at pounds- and hazard-based results using the same kinds of combinations and comparisons. For a detailed description of the Indicators model and components of the model, refer to *Toxic Release Inventory Relative Risk-Based Environmental Indicators Methodology* (U.S. EPA, forthcoming), which represents the most recent full documentation of the model. Appendix A of the Methodology document also describes other systems for ranking chemicals, which can be compared with the Indicators model.

Geographic Basis of the Model

The RSEI model relies on the ability to locate facilities and people geographically, and to attribute physical characteristics, such as meteorology, to the facilities once they are located.

[3] The method is focused on general populations; individuals, particularly highly exposed individuals, are not the focus of the Chronic Human Health Indicator. Additional Indicators based upon highly exposed subpopulations may be developed in the future.

To locate the facilities and the attribute data to those facilities, the RSEI model describes the U.S. and its territories[4] as a 1 km by 1 km grid system. For each cell in the grid, a location "address" in terms of (X,Y) coordinates is assigned based on latitude and longitude (lat/long).

Each (X,Y) pair defines the center point of one cell in the grid. Using the (X,Y) pair, the boundary of each cell can be constructed with the four corner points: (X+0.5, Y+0.5) for the upper right corner, (X+0.5,Y-0.5) for the lower right corner, (X-0.5,Y-0.5) for the lower left corner, and (X-0.5,Y+0.5) for the upper left corner. The equations used to determine the (X,Y) coordinates defining the center of a given cell from lat/long data are presented in the *Methodology* document.

Once the grid system for the U.S. is established, facilities can be located in it. The ability of the RSEI model to accurately locate a facility depends on the accuracy of the lat/long coordinates describing its location. Each facility reporting to TRI is instructed in Form R to provide the lat/long coordinates of the facility, or, if the facility is large, the lat/long coordinates of a point central to the production activities of the facility. These reported coordinates are of varying levels of quality, so, before locating facilities on the RSEI model grid, EPA performs a quality assurance procedure using the reported coordinates, other EPA locational data, and commercial geocoding services.[5] The same equations that determine the (X,Y) coordinates of the grid cells are then used to transform facility lat/long coordinates to (X,Y) coordinates. The facility can then be located in the grid system for further modeling.

In order to estimate potential exposure, the U.S. population must also be geographically located on the model grid. The RSEI model uses U.S. Decennial Census data for 1990 and 2000 at the block level.[6] In previous versions of the model, U.S. Census race categories were available for viewing on the map (not for calculating results). However, due to complications arising from changes in race categorization for the 2000 Census, race categories are not available for viewing in the current version of the model. The following sections describe how

[4] The model also includes Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, and the Northern Marianis Islands.

[5] Geocoding services were provided by Thomas Computing Services.

[6] U.S. Census data were provided by GeoLytics, Inc.

the U.S. Census data is used to generate annual population estimates for age and sex, and how the unit of analysis for the U.S. Census (the block) is translated into the unit of analysis for the model (the grid cell).

Population data. U.S. Census block-level data are used to estimate the number of people in each grid cell, as well as their demographic characteristics. Census blocks are the smallest geographic area for which decennial census data are collected. Blocks are of varying size, formed by streets, roads, railroads, streams and other bodies of water, other visible physical and cultural features, and the legal boundaries shown on Census Bureau maps. In 1990, there were approximately 7 million census blocks. Due to boundary changes and increased resolution for highly populated areas, there were approximately 9 million blocks in the 2000 Census.

Block-level information from the 1990 Census and the 2000 Census[7] are used to create detailed age-sex variables for each of the census blocks in the US for 1990 and for 2000. The following variables are available in the RSEI model:

- Males Aged 0 through 9 years
- Males Aged 10 through 17 years
- Males Aged 18 through 44 years
- Males Aged 45 through 64 years
- Males Aged 65 years and Up
- Females Aged 0 through 9 years
- Females Aged 10 through 17 years
- Females Aged 18 through 44 years
- Females Aged 45 through 64 years
- Females Aged 65 years and Up

Because the Census block boundaries have changed between 1990 and 2000, the block level data is first transferred to the RSEI model grid, which is unchanging, using the method described below in 'Mapping block populations to grid cells.' Once on the grid, a straight-line

[7] For 1990, not all of the variables were available at the block level. For those variables that were only available at the block group level, block group ratios were calculated and applied to the data at the block level. For 2000, all of the required data were available at the block level.

interpolation is performed for each grid cell between 1990 to 2000 to create annual estimates of the population for each grid cell for each year. The straight line is also extended to estimate population for 1988 and 1989.

Puerto Rico and Territories. For Puerto Rico, mapping limitations dictated the use of block group data rather than block level data for 1990 (shapefiles were not available at the lower level of resolution). However, block level data was used for 2000. For the U.S. Virgin Islands, American Samoa, Guam, and the Northern Mariana Islands, mapping was limited to whole-island areas or county equivalents, so the population data is also at this level of detail. Detailed demographic data were not available, so Census Bureau estimates of age and sex ratios for 2000 were used instead, and applied to actual 1990 and 2000 Census totals.

Mapping block populations to grid cells. Once annual detailed demographic data sets are created, the model translates the data from Census blocks to the model's 1 km by 1 km grid cells. The Census provides the geometry for each block in the Topologically Integrated Geographic Encoding and Referencing (TIGER) geographic database. The boundaries and area for each block were derived from the TIGER database. The location of each grid cell is defined by its four corner points, calculated from its (X,Y) coordinates. The Indicators model uses the derived block boundary files to map each block to its corresponding cells in the grid according to the portion of the block's total area that falls within each cell. The area of a block that falls within a grid cell is divided by the total area for that block, then that fraction is multiplied by the block's population and subpopulations to determine its contribution to the grid cell's population. If more than one block overlays a grid cell, then the populations contributed by the multiple blocks are summed.

Components of the Model

Once facilities and people are located on the model's grid, three main components are used to compute risk-related impacts in the RSEI model. These components are:

- the quantity of chemicals released or transferred,
- adjustments for chronic human health toxicity,
- adjustments for exposure potential and population size

These components and the method used to combine them are described in the following sections.

Chemical Releases and Transfers

The RSEI model uses information on facilities' chemical releases and transfers from these facilities to off-site facilities (such as sewage treatment plants) to model risk-related impacts. These releases are reported by facilities to the Toxics Release Inventory (as mandated by the Emergency Planning and Community Right-to-Know Act). As of the 1999 reporting year, there are 607 TRI chemicals and chemical categories listed.

Adjustments for Chronic Human Health Toxicity

The Chronic Human Health Indicator is based on current EPA methodologies for assessing toxicity. The method EPA has chosen for assigning toxicity weights to chemicals is clear and reproducible, based upon easily accessible and publicly available information, and uses expert EPA-wide judgments to the greatest extent possible. RSEI reflects the toxicities of chemicals relative to one another using a continuous system of numerical weights. Toxicity weights for chemicals increase as the toxicological potential to cause chronic human health effects increases.

- ### Toxicity Data

Values developed by EPA experts are used to differentiate the degrees and types of toxicity of chemicals and rank them in a consistent manner. Values called Oral Slope Factors and Inhalation Unit Risks[8] provide information pertaining to toxicity for chemicals that may cause cancer. Reference Doses (RfDs) and Reference Concentrations (RfCs) provide toxicity information related to noncancer effects.[9]

[8] The Oral Slope Factor represents the upper-bound (approximating a 95% confidence limit) estimate of the slope of the dose-response curve in the low-dose region for carcinogens. The units of the slope factor are usually expressed as $(mg/kg\text{-}day)^{-1}$. The Inhalation Unit Risk is the upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 $\mu g/m^3$ in air.

[9] RfDs and RfCs are estimates (with uncertainty spanning perhaps an order of magnitude) of daily exposure [RfD], or continuous inhalation exposure [RfC], to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious noncancer effects during a lifetime.

The following data sources are used, in the order of preference:

- EPA's Integrated Risk Information System (IRIS)
- EPA Office of Pesticide Programs' Toxicity Tracking Reports (OPP)
- Agency for Toxic Substances and Disease Registry final, published chronic MRLs (ATSDR)
- California Environmental Protection Agency's Office of Environmental Health Hazard Assessment final, published toxicity values (Cal/EPA)
- EPA's Health Effects Assessment Summary Tables (HEAST)
- Final Derived/Interim Derived Toxicity Weights (Derived) estimated by EPA's Office of Pollution Prevention and Toxics.

The data sources are used in a tiered fashion. The first tier consists of IRIS and OPP. The most recent data for each chemical's chronic human health endpoint is used. If the dates are comparable, preference is given to IRIS. The second tier consists of ATSDR and Cal/EPA. Again, the most recent source of the two is used for any chemical's chronic human health endpoint not found in the first tier. In the absence of data from first or second tier sources for an individual chronic health endpoint, the following data sources are used, in the order of preference: HEAST, Final/Interim Derived, and IRIS values previously used in toxicity weighting, but withdrawn pending revision.

For chemicals with carcinogenicity risk values, Weight of Evidence (WOE)[10] values were obtained using the same data source hierarchy. Therefore, preference was given to WOE's from IRIS or OPP. As a general rule, chemicals with cancer potency factors from IRIS or OPP will also have WOEs. CalEPA, however, references either EPA or IARC for WOE designations. Therefore, in the absence of an EPA consensus WOE, WOE's were obtained from the International Agency for Research on Cancer (IARC). However, due to the

[10] Based on the quality and adequacy of data on carcinogenicity, EPA places a chemical in one of the following five wight of evidence categories, as specified in 51 FR 33996:

A	Carcinogenic to humans	
B	Probable carcinogen	
	B1	Indicates limited human evidence
	B2	Indicates sufficient evidence in animals and inadequate or no evidence in humans
C	Possible carcinogen	
D	Not classifiable	
E	Evidence of non-carcinogenicity	

differences in WOE definition, it is not always possible to translate IARC WOE's into EPA WOE's without examining the toxicity data. WOE's were matched in the following way:

- IARC Group 1 = EPA Group A (Human Carcinogen)
- IARC Group 2A = EPA Group B (Probable Human Carcinogen)
- IARC Group 2B = EPA Group B or EPA Group C (Possible Carcinogen)
- IARC Group 3 = EPA Group D (Not Classifiable as to Human Carcinogenicity)
- IARC Group 4 = EPA Group E (Evidence of Non-Carcinogenicity)

The IARC 2B designation is not easily translated to the EPA designation, and spans EPA Groups B and C. This is a particularly important distinction because the use of a B2 or C designation will affect the calculation of the toxicity weight (see below). Therefore, for the chemicals with IARC 2B designations, summaries of the toxicity data used to generate the oral slope factor or inhalation unit risk were evaluated to derive WOEs. Since these are primarily chemicals with data from CalEPA, the CalEPA "Technical Support Document for Describing Available Cancer Potency Factors" was used for the background information.

• Calculating Toxicity Weights

The Indicator toxicity scoring method separately evaluates exposure routes (inhalation and oral) and classes of effects (cancer and noncancer). For each route, chemicals are scored based on their single most sensitive adverse effect. Except for the cancer/noncancer distinction, the toxicity weighting methodology does not distinguish between chemicals based on type or target of effect (e.g., neurotoxicity *vs*. developmental toxicity), nor does it address multiple effects which may be exhibited by a chemical. When values are available for only one route of exposure, ordinarily the same toxicity weight is applied to reflect the potential for both inhalation and oral toxicity, provided there is no evidence the effects are route-specific or limited to the portal of entry into the body. Specifically, in rare instances, toxicity studies are available to show a given chemical causes no health effects by one exposure route. In these instances, a toxicity weight is assigned only to the route that results in chronic human health effects.

In the Indicator methodology, the following algorithms are used to assign toxicity weights:

non-carcinogens:	0.5 / RfD (mg/kg-day) or 1.8 / RfC (mg/m^3)
carcinogens (WOE categories A and B):	Oral Slope Factor (risk per mg/kg-day)/ 0.0005 or Inhalation Unit Risk (risk per mg/m^3)/ 0.00014
carcinogens (WOE category C):	Oral Slope Factor (risk per mg/kg-day)/ (0.0005 * 10) or Inhalation Unit Risk (risk per mg/m^3)/ (0.00014 * 10)

These constants maintain the equivalency between cancer and noncancer scores that was established in the Hazard Ranking System (HRS) scoring methodology used in EPA's Superfund program.[11] When combining cancer and noncancer endpoints, it is assumed that exposure at the level of the RfD is equivalent to a 2.5×10^{-4} cancer risk.

The distribution of toxicity values for TRI chemicals corresponds to a range of toxicity weights of approximately 0.1 to 1,000,000 for carcinogens and approximately 0.001 to 100,000 for non-carcinogens. However, toxicity weights are not bounded. Continuous toxicity weights are expressed as values with two significant figures.

There are 607 chemicals and chemical categories on the 1999 TRI Chemical List. Toxicity weights are available for 425 of these chemicals and chemical categories. The 425 chemicals with toxicity weights account for over 98% of the reported pounds for all on-site releases in 1999. The Indicator elements are recomputed for all years in the TRI database on an annual basis in order to incorporate revisions to the reporting data.

A complete discussion of the methods used in these evaluations, as well as the chemical-by-chemical data summaries and score assignments, are provided in *Toxics Release Inventory Relative Risk-based Indicators: Interim Toxicity Weighting Summary Document* (U.S. EPA, 1997b) and amended by *EPA's Risk-Screening Environmental Indicators: Toxicity Weights for Toxics Release Inventory (TRI) Chemicals and Chemical Categories* (U.S. EPA, April 28, 1998).

[11] U.S. Environmental Protection Agency (EPA). 1990b. *Hazard Ranking System: Final Rule*. 55 *Federal Register* 241. pp. 51532-51667.

Adjustments for Exposure Potential

Quantitatively, exposure potential is estimated using a "surrogate" dose. To estimate the surrogate dose, a separate exposure evaluation is conducted for each pathway-specific chemical emission. The exposure evaluations use models that incorporate data on media- and pathway-specific chemical releases and transfers, physicochemical properties and, where available, site characteristics, to estimate the ambient chemical concentration in the medium into which the chemical is released or transferred. The ambient concentrations are combined with human exposure assumptions and estimates of exposed population size specific to age and sex. Specific exposure factors are discussed in each section below.

The algorithms for calculating surrogate doses rely on the ability to locate facilities and people geographically on the 1 km by 1 km grid cell system described earlier. While this method uses the EPA exposure assessment paradigm to evaluate exposure potential, the results should not be construed as an actual numerical estimate of dose resulting from TRI releases, because limited facility-specific data and the use of models that rely on default values for many parameters prevent the calculation of an actual dose. Instead, the purpose of the methodology is to generate as accurate a surrogate dose as possible without conducting an in-depth risk assessment. The estimates of surrogate doses from releases of TRI chemicals are *relative to the surrogate doses resulting from other releases included in the model*.

The sections below discuss each of the exposure pathways included in the model. Please note that not all pathways are currently modeled in the RSEI model. For pathways that are not modeled, risk-related results are not available, but users can examine results from pounds-based and hazard-based perspectives.

• Stack and Fugitive Air Releases

This method uses algorithms from the Industrial Source Complex Long Term (ISCLT3) model developed by the Office of Air Quality Planning and Standards (OAQPS). ISCLT3 is a steady-state Gaussian plume model used to estimate long-term pollutant concentrations downwind of a stack or area source. The concentration is a function of facility-specific parameters (such as stack height and diameter), meteorology, and chemical-specific, first-order air decay rates. The air decay rates are based on either photooxidation or, in rare cases, hydrolysis in air.

In the RSEI model, each facility is located in a 1 km by 1 km grid cell based on its reported lat/long. For simplification, the model places the facility at the center of the grid cell where it is located. However, the facility may be up to 707 m from the center of the grid cell. (707 m is calculated as the hypotenuse of an isosceles triangle with both sides of length 500 m.)

The ISCLT3 model then uses meteorological and chemical-specific decay rates to estimate the air concentrations for each grid cell in a 101 km by 101 km area [i.e. 50 km in each cardinal direction of the compass] surrounding the grid cell containing the facility. For each of the 10,201 1 km by 1 km cells, an air concentration for a given chemical is calculated at the midpoint of the edge closest to the source in the center cell. For the center cell in which the facility is located, the RSEI model previously assigned the highest air concentration from the eight cells surrounding that cell. In Version 2, the model splits the center cell into 401 sub-cells (each sub-cell is 50 m by 50 m), and assigns the average concentration of these sub-cells to the 1 km by 1 km center cell.

Stack height data were obtained from the AIRS Facility Subsystem (AFS) within the Aerometric Information Retrieval System (AIRS), the National Emission Trends (NET) Database, and databases from three individual states (California, New York, and Wisconsin). For each TRI facility that had stack height data in one or more of these sources, the median height of all stacks at the facility is used in the RSEI model. For the TRI facilities which had no stack height data in these sources, a Standard Industrial Classification (SIC) code-based median stack height is assigned to the facility. The SIC code-based stack height is estimated from data in AFS and the Trends Database for facilities in the appropriate 3-digit SIC code or in the 2-digit SIC code if the 3-digit SIC code is unavailable. If no 2-digit SIC code is available, the median of all stack heights with TRI-reportable SIC codes is used.[12]

For both stack diameter and exit gas velocity, the RSEI model uses the same data sources, criteria, and statistical methods described above for stack height data. Specifically, the RSEI model uses either the median value of all stacks for TRI facilities with this information or an SIC

[12] Statistical analyses were conducted to determine whether heights of stacks not emitting any TRI chemicals should be included in the calculation of median stack height for facilities. If no statistically significant differences existed between stacks emitting TRI chemicals and those not emitting TRI chemicals, then all stack heights for all facilities in the relevant SIC code were used to estimate the median stack height for that SIC code. If there was a statistically significant height difference between the two groups of stacks, then only stacks emitting TRI chemicals were used to calculate the median stack height for that SIC code.

code-based median value for facilities without the appropriate stack data. Exit gas velocity data are obtained from AFS, NET, and state-specific databases. Stack diameter data are obtained from AFS and NET.

An additional data source was used for some of the new industries added in Reporting Year 1998. The Electric Power Research Institute (EPRI) provided EPA with two databases of site-specific data for electric utilities, including stack height, stack diameter, and stack velocity. Approximately 600 TRI facilities report one of the three electric utility SIC codes (4911- Electric Services; 4931- Electric and Other Services Combined; or 4939- Combination Utilities, not elsewhere classified). Where possible, TRI facilities were matched to facilities in the EPRI data, and the EPRI stack parameters were used. For the facilities that could not be matched, the median parameters from the EPRI data were used.

Analyses have been conducted that show the concentrations predicted by the RSEI model using a combination of generic and site-specific data closely match concentrations estimated by using more complete site-specific data. For complete details on the derivation of stack parameter data, see Technical Appendix E.

For air releases, chemical concentrations are calculated for each grid cell inside a 101 km square surrounding the facility. The concentration is multiplied by age-sex specific inhalation rates, as shown in Table 1-1 below. This calculates the surrogate dose for each of the ten age-sex categories included in the RSEI model. The population assigned to each grid cell is assumed to be exposed to the concentration calculated for that grid cell.

Table 1-1. Exposure Factors for Air Releases

Age-Sex Category	Inhalation Rate (m3/kg/day)
Male 0 to 9	0.341
Male 10 to 17	0.341
Male 18 to 44	0.209
Male 45 to 64	0.194
Male 65 and up	0.174
Female 0 to 9	0.31
Female 10 to 17	0.31
Female 18 to 44	0.186
Female 45 to 64	0.165
Female 65 and up	0.153

- **Direct Surface Water Releases**

Chemicals released directly to surface waters are modeled using a simple first-order decay equation, along with estimates of river discharge and velocity. Chemical concentrations are estimated for distances up to 200 km downstream from the chemical release to take into account drinking water intakes up to 200 km downstream. The chemical-specific decay coefficient is predominantly based on either abiotic hydrolysis or microbial biodegradation, but it may also be based on photooxidation.

This method considers two chronic human health exposure pathways from surface water releases. First, exposures from drinking water are calculated. Chemical releases from onsite or

offsite facilities into water are assumed to be discharged into the stream reach[13] nearest the facility. As the chemical travels downstream, concentrations at public drinking water intakes are estimated. The population served by the water system supplied by the intake is assumed to be the population exposed to the chemical concentration. RSEI models all the cells surrounding an intake until the population total is reached. This may not reflect population at distant areas served by that intake. Drinking water ingestion rates are shown in Table 1-2 below. If a stream reach contains no drinking water intake, the exposed population is zero. The concentrations at the drinking water intake for chemicals for which EPA has established Maximum Contaminant Levels (MCLs) are assumed to not exceed the relevant MCLs that were in effect for the year of the release.[14]

A second potential exposure pathway is from consumption of contaminated fish. Each segment of the affected surface water reach may contain contaminated fish which could be caught and eaten by recreational and subsistence fishers. As described above, the model tracks the concentration of the chemical as it travels downstream. In each stream reach, the estimated concentration in fish is derived by multiplying the chemical concentration in the water by a factor to account for bioconcentration of the chemical from water into fish. County- and state-specific fishing license data is used to estimate the percentage of people in each county who fish. This number is multiplied by an estimate of average household size to obtain the portion of each county's total population that eats fish. Since most fishers travel a maximum of 50 miles to fish, the population within 50 miles of a reach modeled as having a nonzero chemical concentration is multiplied by the county-specific fish-eating percentage to obtain the total exposed population. Recreational fishers and their families, who eat a small amount of fish, are assumed to comprise 95 percent of this exposed population. Subsistence fishers and families, who eat fish as a large part of their diet, make up the remaining 5 percent. Recreational and subsistence fishers are also assumed to have differing fish ingestion rates, as shown in Table 1-2 below.

[13] Streams are divided into reaches, which are lineal sections of a stream transport path.

[14] RSEI contains information on yearly values for MCLs. However, information for some chemicals for MCLs prior to 1991 were not available. See 'MCL' table in Chapter 4 (Viewing Data), for details.

Table 1-2. Exposure Factors for Water Releases

Age-Sex Category	Drinking Water Ingestion Rate (L/kg/day)	Recreational Fish Ingestion Rate (g/kg/day)	Subsistence Fish Ingestion Rate (g/kg/day)
Male 0 to 9	0.0298	0.0756	2.83
Male 10 to 17	0.0298	0.0756	2.83
Male 18 to 44	0.0184	0.199	1.92
Male 45 to 64	0.022	0.407	2.08
Male 65 and up	0.0219	0.434	2.22
Female 0 to 9	0.0298	0.0372	2.05
Female 10 to 17	0.0298	0.0372	2.05
Female 18 to 44	0.0184	0.114	1.71
Female 45 to 64	0.022	0.262	1.6
Female 65 and up	0.0219	0.267	1.63

- **Land Releases**

On- and off-site land releases include releases to landfills, surface impoundments, land treatment units and underground injection wells. For these releases, two major exposure pathways are of interest - volatilization to air or leaching into groundwater. Volatilization of chemicals from *on-site* land releases is reported to TRI under the fugitive emission estimate for the facility, and is handled as a fugitive air release. For more information on RSEI modeling of fugitive air releases, see "Air Releases" above. EPA is evaluating screening-level methodologies which might be used to assess risk-related exposures pertaining to groundwater exposure from land releases and volatilization from off-site land releases, so this version of RSEI does not provide risk modeling for reported land releases. However, RSEI does provide the capability for users to examine the pounds of releases to land that are reported to TRI, as well as viewing these releases from a hazard-based perspective.

The potential for groundwater contamination from land releases depends on the regulatory status of the unit in which the chemical is released. For example, chemicals could be deposited in an on-site RCRA-regulated, subtitle C hazardous waste unit, or in an on-site nonhazardous solid waste management unit. RCRA standards for hazardous waste units are, by regulation, designed to include technical controls to prevent release of contaminants into groundwater. If chemicals are placed in such regulated units, EPA assumes that releases to groundwater are

negligible so RSEI would assign a zero value to the risk-related scores for such releases. If chemicals are placed in nonhazardous land disposal units (landfills, etc.), there is a potential for exposure. This exposure pathway and volatilization from off-site landfills are currently under review for inclusion in a future version of RSEI.

On- and off-site land releases to underground injection will not be modeled for exposure by RSEI. The hydrogeological, spatial, and temporal considerations that are associated with exposures to toxic chemicals in underground injection wells are situation- and site-specific, so RSEI is only able to provide pounds-based and hazard-based perspectives for this type of land release. Note, however, that under well-managed conditions, Class I wells (there are five classes of wells) are specifically designed to pose minimal risk to human health or the environment.

! Releases to POTWs

Modeling exposure from TRI-reported transfers to Publicly-Owned Treatment Works (POTWs) requires: (1) location of the POTW to which the chemicals are discharged, (2) consideration of overall removal efficiencies of POTWs and resulting effluent discharges from POTWs, (3) consideration of residuals management at POTWs, and 4) identification of the receiving stream reach.

Locating the POTW. POTW names and addresses are reported to TRI by the facility transferring its waste. Latitude and longitude are not reported. In order to derive coordinates, the reported street addresses were geocoded (coordinates were assigned based on street address) by Thomas Computing Services, a commercial firm. For those facilities with insufficient or incorrect street addresses, the facility is assumed to be located at the center of its reported zip code. Once latitude and longitude for a facility are determined, the data are used to map the facility to a given grid cell, using the equations described in Chapter III of the Methodology document. Substantial data processing was necessary to prepare the set offsite facilities for use in the model; see Technical Appendix D for details on the steps that were taken.

Overall POTW Removal Rate. POTWs cannot completely remove all of the chemicals that are transferred to the plant from the TRI facility. Some of the chemical loading in the influent will be discharged as effluent to surface waters. To calculate the fraction of transferred chemical removed by the POTW, the typical contaminant-specific removal rate is applied to the volume transferred to the POTW from the TRI facility.

Partitioning within the POTW. Chemical loadings may be removed by the POTW treatment processes through biodegradation, volatilization, and adsorption to sludge. The amount of the chemical that is removed by each of these processes is modeled using average chemical-specific partitioning rates.

Once the fates of chemicals entering the POTW are estimated, exposures associated with chemical loadings to each compartment are estimated. Chemicals discharged in the POTW effluent are modeled using the surface water evaluation methods described above. Chemicals that biodegrade are assumed to degrade to chemicals that do not pose risk. POTW volatilization releases are treated like area-source air releases, as described above.

For chemicals that partition to sludge, the model used to estimate exposure should ideally depend on the sludge disposal method employed by the POTW. However, sludge disposal practices at a POTW receiving a TRI transfer cannot be determined from the TRI database. Therefore, the RSEI algorithm currently assumes all POTW sludge to be landfilled at the POTW, a common method of sludge disposal. Landfilling of sludge is not currently modeled in RSEI. POTWs may in reality use other methods of sludge disposal, such as incineration of sludge. If sludge were incinerated by a POTW, for example, this would result in different exposure levels (and a different, larger exposed population).

Locating the receiving stream reach. In the same method as for TRI reporting facilities, POTWs are assumed to discharge to the nearest stream reach. However, some POTW-specific information from EPA data sources was used where it was available.

- **Off-site Transfers**

This category includes any transfers to waste brokers, non-POTW treatment facilities or recycling facilities, and includes such offsite activities as storage, recycling and recovery, treatment, incineration, underground injection, landfill, and land treatment (i.e., those TRI media codes beginning with 'M'). TRI reporters are required to supply the name and address of the facility that receives wastes for storage or disposal. From these data, EPA determines whether wastes are sent to a hazardous or nonhazardous waste management facility. As with underground injection wells, transfers to RCRA hazardous waste facilities are not modeled. If chemicals are placed in such regulated units, it is assumed that releases to groundwater are negligible.

As with transfers to POTWs, the off-site facility is located by geocoding the submitted street addresses, or if that is not available, using the zip code centroid.

The RSEI methodology then requires information on the treatment and disposal technologies used by the facility. If the treatment method is incineration, then destruction and removal efficiencies (DREs) are applied to the transfer amount, and the releases are modeled using ISCLT3, as described above in the discussion of stack and fugitive air releases.

For off-site landfills, two major exposure pathways are considered: groundwater and volatilization. These pathways are currently not modeled, but are under review for a future version of RSEI. However, users can examine pounds- and hazard-based perspectives for these pathways.

Calculating an Indicator

Indicator Elements

The toxicity, exposure potential, and population components are first combined multiplicatively to obtain a chemical-facility-medium-specific Indicator Element for each year, as follows:

$$\text{Indicator Element}_{c,f,p} = \text{Toxicity Weight}_{c,p} * \text{Surrogate Dose}_{c,f,p} * \text{Exposed Population}_{f,p}$$

where:

c	=	subscript for chemical *c*,
f	=	subscript for facility *f*, and
m	=	subscript for pathway *p*.

Therefore, the product of these components is a chemical-facility-pathway-specific Indicator Element. This element is a unitless measure that is *not* independently meaningful, but is a risk-related estimate that can be compared to other estimates calculated using the same methods.

Approximately 3.5 million Indicator Elements are calculated for the twelve years of TRI reporting data (1988-1999). These are based on approximately 2.4 million distinct chemical releases and transfers reported to TRI.[15]

Overall Indicator Value

The overall Indicator Value is calculated by summing all the relevant individual TRI chemical-facility-medium-specific Indicator Elements, as follows:

$$I = \sum \sum \sum IE_{c,f,p}$$

where:

I	=	Chronic Human Health Indicator, and
$IE_{c,f,p}$	=	chemical-facility-pathway-specific Indicator Element.

In this method, each component weight makes a contribution proportional to its size. The resulting value can be used in a number of ways. For example, Subindicators can be calculated for various subsets of variables (e.g., chemical, facility, pathway) that compose the Indicator Elements. *It must be reiterated that while changes in weights over the years would imply that there have been changes in risk-related environmental impacts, the actual magnitude of any specific risk or reason for a change in risk is unknown. Although the weight itself may be useful in identifying facilities or chemicals with the highest potential for risk, the weight does not represent a quantitative estimate of risk or provide an exact indication of the magnitude of individual risk associated with that facility or chemical.*

Analyses That Can be Performed Using the RSEI Model

Users of the RSEI model can perform, in a matter of minutes or hours, a variety of screening-level analyses. Previously, such activities would have taken days, weeks, or even months to organize the relevant information, evaluate that information, and perform the complex and sophisticated analyses that are necessary to provide a risk-related perspective. Indicator

[15] Because some releases go to more than one pathway (for instance, each direct water releases goes to both the fish consumption and the drinking water pathway), the total number of elements is always greater than the total number of releases.

results can be used for screening-level ranking and prioritization for strategic planning purposes, risk-related targeting, and trends analyses. Considerable resources can be saved by conducting preliminary analyses with the RSEI model to identify risk-related situations of high potential concern, and which warrant further evaluation.

As noted above, users can evaluate releases using a number of variables, such as chemical, medium, geographic area or industry (see Chapter 5 for a complete listing of the variables included in the model). For instance, the following types of questions can be investigated: How do industry sectors compare to one another from a risk-related perspective? What is the relative contribution of chemicals within a given industry sector? What release pathway for a particular chemical poses the greatest risk-related impacts?

The Indicator also allows the user to investigate the relative influence of toxicity and population on the risk-related results, which also incorporate exposure modeling. In addition, users can consider cancer and noncancer health endpoints independently or in combination. Finally, the use of the RSEI model is not limited to TRI chemicals. The adaptable method can model any chemical if toxicity characteristics, physicochemical properties, release levels, and release location are known or can be estimated.

The current version of the RSEI model available to the public has full modeling of only the air and surface water exposure pathways, but future versions will provide full modeling of all exposure pathways. Information regarding the Risk-Screening Environmental RSEI project is available on the OPPT web site.[16]

[16] For current information or inquiries regarding the Risk-Screening Environmental Indicators Project, please contact: Gary Cole, Ph.D., (202) 564-8808, cole.gary@epa.gov, or Steven Hassur, Ph.D., (202) 564-8558, hassur.steven@epa.gov. Or, see www.epa.gov/opptintr/env_ind.

Important Caveats Regarding the RSEI

RSEI is a screening tool that provides a risk-related perspective in assessing the relative impacts of releases of toxic chemicals. Risk-related results are available for releases and transfers to air and water, and pounds- and hazard-based results are available for all media. RSEI combines estimates of toxicity, exposure level, and the exposed population to provide risk-related comparisons. It does not provide a detailed or quantitative assessment of risk, and is not designed as a substitute for more comprehensive, site-specific risk assessments. There are a number of important considerations associated with each component of the RSEI model, as described in the following sections.

Toxicity Component

The following caveats should be considered regarding the toxicity component of the RSEI model:

- Toxicity weights are not designed to (and may not) correlate with statutory criteria used for listing and delisting chemicals in TRI. RSEI risk-related model results account for estimated exposure and may not correlate with listing/de-listing decisions.

- The RSEI model only addresses chronic human toxicity (cancer and noncancer effects, e.g., developmental toxicity, reproductive toxicity, neurotoxicity, etc.) associated with long-term exposure and does not address concerns for either acute human toxicity or environmental toxicity.

- Toxicity weights are based upon the single, most sensitive chronic health endpoint for inhalation or oral exposure pathways, and do not reflect severity of effects or multiple health effects.

- Estimated Reference Doses and Reference Concentrations for noncancer effects incorporate uncertainty factors which are reflected in toxicity weights that are based upon these values.

- Several significant assumptions are made regarding metals and metal compounds, because important data regarding these chemicals are not subject to TRI reporting. Metals and metal compounds are assumed to be released in the valence (or oxidation) state associated with the highest chronic toxicity weight (for chromium, the higher

valence state has greater toxicity, e.g., Cr^{+6} vs. Cr^{+3}). Metal compounds are assumed to have the same toxicity weight as the parent metal, although the chronic toxicity of some metal compounds may be higher or lower. While the physical form of released metals or metal compounds can affect toxicity, a reasonable assumption is made regarding the likely form of most releases (e.g., the non-cancer toxicity weight for chromic acid mists and dissolved hexavalent chromium aerosols is much higher than for hexavalent chromium particulates, but releases of these chemicals as acid aerosols are not expected to be typical so the intermediate toxicity weight for cancer based on the inhalation of particulates is used). Analysts need to consider these assumptions, and whether the gathering of additional data is warranted, when examining model results for metals and metal compounds.

Exposure Component

The following caveats should be considered regarding the exposure component of the RSEI model:

- Like other exposure models, the RSEI model estimates exposure levels (it does not yield actual exposures). However, the model does provide estimated air concentrations in each grid cell.

- The model uses some generic assumptions, e.g., default median stack heights, diameters, and exit gas velocities related to 2- or 3-digit SIC codes, or a nationwide median, where facility-specific median stack height, diameter, and exit gas velocity data are unavailable.

- In the current version of the model, only air and direct surface water exposures are fully modeled.

- The model does not account for population activity patterns.

Population Component

The following caveats should be considered regarding the population component of the RSEI model:

- Drinking water populations are estimated by using the total drinking water populations associated with individual downstream drinking water intakes. Estimated populations for the fish ingestion pathway are based upon U.S. Fish and Wildlife Service surveys.

- Because the Indicator reflects changing population size at the local level, a facility's relative contribution to the Indicator could increase or decrease even without changes in its releases over time. While the Indicator is designed to reflect the overall risk-related impacts on the local population, such population changes should be considered when examining a facility's environmental management practices.

- The Indicator also has greater uncertainty when examining disaggregated results at the local or facility level.

Strengths and Limitations of the Chronic Human Health Indicator

Strengths

The following are strengths of the RSEI model:

- The model provides an important risk-related perspective (incorporating toxicity characteristics, exposure and population) regarding the impacts of TRI releases.

- The RSEI model allows for greatly increased speed in performing screening analyses, thereby conserving resources for conducting more precise, site-specific risk evaluations. In addition, its use as a priority-setting tool allows resources to be focused in areas that will provide the greatest benefits from risk reduction.

- This screening-level tool uses sophisticated hazard-based and risk-related approaches that are capable of quickly organizing and evaluating data in a complex manner.

- The Indicator has been subjected to repeated expert peer review over a ten-year period.
- Complete and detailed documentation of the RSEI model is available.
- The model can perform single- and multi-media analyses.
- Custom-designed selections can be based upon a wide range of variables.
- This adaptable methodology can model any chemical if toxicity characteristics, appropriate physicochemical properties, release levels and release location are known or can be estimated.
- The air exposure model is combined with U.S. Census data to directly estimate the size of exposed populations and subpopulations and the magnitude of their exposure, rather than assuming that all individuals surrounding a facility are equally exposed.

Limitations

The following are limitations of the RSEI model:

- Indicator results do not provide users with a quantitative risk estimate (e.g., excess cases of cancer).
- The Indicator does not evaluate individual risk.
- The RSEI model does not account for all sources of TRI chemicals, only those sources that are required to report to TRI. It also does not provide scores for all TRI chemicals, although chemicals without toxicity weights account for a very small percentage of total releases and of total risk-related impacts.
- TRI does not account for all toxic chemicals.
- The RSEI model assumes that air concentrations of TRI chemicals are the same for indoor and outdoor exposures, and that populations are continuously exposed.

- Dermal and food ingestion pathways (other than fish consumption), and some other indirect exposure pathways are not evaluated at the present time.

- Acute health effects associated with short-term, periodic exposures to higher levels of these same chemicals are not addressed; a separate indicator will be developed to address acute effects.

- A separate indicator will be developed to address ecological effects.

CHAPTER 2
What Has Changed Since Version 1.02?

The new version of the RSEI model is much more powerful and flexible than previous versions. It allows for new kinds of analyses and new ways of displaying results.

More Refined Data

The underlying data in the model has been expanded and refined for greater detail. Population data from the most recent decennial Census has been added, and translated onto to the model grid geographically for greater accuracy. Offsite facilities have been assigned to their actual locations where possible, and TRI reporting facilities have had their reported locations double-checked and corrected where necessary. Physicochemical and toxicity data for reported chemicals have been updated, and more detailed (age- and sex-specific, where possible) exposure factors are now used.

New 'Easy' Interface

In addition to the advanced user interface that allows for many different ways of customizing your results, Version 2.0 also features the **Easy RSEI** interface, which offers a quick and easy way for beginning users to get started using the model. In seconds, users can view rankings and trends for chemicals, industry sectors, states, or EPA regions at various geographic levels.

Water Pathways Available

For the first time, full risk-related results are available for water pathways (drinking water and fish ingestion) associated with direct on-site surface water releases and with off-site releases to Publically Owned Treatment Works (POTWs). Previous versions of the model only included risk-related modeling for the air pathway (fugitive and stack air, including on-site incineration).

Expanded Air Modeling

Changes have been made to air modeling methodology so that the model more accurately represents concentrations very close to the facility. In addition, previous versions only modeled concentrations out to 10 km from the facility; the current version models out 50 km to better reflect the extended plumes associated with very tall stacks.

New Geographic Options

The new version has fully integrated geographic capabilities. It allows you to select and display facilities geographically. Just by clicking a button, you can display the population density and specific concentrations from chemical releases to air surrounding a facility for a specific release. In addition, for any small geographic area, you can display the population distribution for any population subgroup, and show the population-weighted air concentrations by subgroup. Overlapping plumes can be counted as well.

Enhanced Query Options

Selections can now be performed based on any variables included in the model. The query builder is much more powerful and flexible, now allowing for any conceivable combination of criteria.

Enhanced Results Display Options

Crosstab tables are much more sophisticated in the new version, and include filters, and the ability to collapse and expand rows and columns, and switch row and column variables. In addition, because selections and table creation are now separate steps, you can create tables using variables that were not included in your query, and create many different tables with different variables based on the same query. The model also contains many preformatted displays, like a list of the facilities and releases in your selected query, pre-sorted results tables based on your crosstab tables, graphs, maps, and reports.

Enhanced Export Options

You can now export tables and lists to many different formats, including Microsoft Excel, Lotus 1-2-3, and dBase files.

Faster Processing

Selections that used to take close to an hour may now take as little as five minutes, depending on the size of the resulting set and the speed of the PC.

New Subelements

You can now examine total pounds, and hazard-weighted and risk-related modeling scores for children 0-9 years of age, children 10-17 years of age, women 18-44 years of age, men 18-44 years of age, and adults 65 years and over separately from the general population.

Tribal Land Identifier

You can now select and examine facilities that are on tribal lands.

CHAPTER 3
Quick Start Tutorials

The following three tutorials will give you a quick introduction to how the model works, and how to quickly find basic information that many users are interested in.

Please Note: The information contained in the following tutorials is current for the RSEI Version 2.0 Beta 2.0 release. If you press 'RSEI Tutorial' on the RSEI start screen, the tutorials that will appear will not be current with this release.

Tutorial 1. Evaluating National-Level Risk-Related Impacts

An important use of the RSEI model is to identify areas that have potentially high risk-related impacts. This exercise will walk you through several different ways of doing this. First, you will perform a national-level selection for 1998. You will look at the results by media and state, and examine the data using several different preformatted functions included in the RSEI model.

Step 1.1 Perform a National-Level Selection

An **element** is the chemical-facility-pathway-year specific building block of the RSEI model. The unitless numerical value that describes the relative risk for each element is called a score. If the element is not modeled, then the score is zero.

The first step in any analysis using the RSEI model is to determine the set of elements you wish to select. This is done by performing a selection. Open up the model to display the **Advanced RSEI** screen. Click on the **Select** button at the top left of the menu panel. This brings up the **Select elements...** screen. Here, you can select elements based on any variables included in the model, including chemical characteristics, geographic location of the facility, year, and many more. You do this by creating a set of selection statements. For this exercise, we will create a very simple selection statement.

Selection statements tell the model what releases you wish to select. Selection statements are comprised of **bracket statements** that tell the model to select records where all, any, none, or not all of the conditions apply and **condition statements**, that specify exactly what your conditions are.

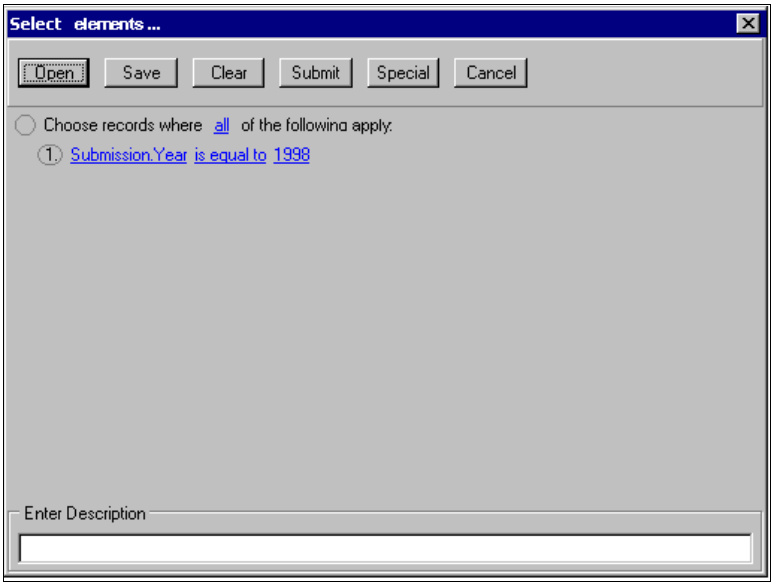
Note that if you have done any selections since installing the RSEI model, your last selection statement will appear on the **Select elements...** screen. To remove it, simply click on the **Clear** button. You will see a line of text on the screen, 'Choose records where all of the following apply'. This is a bracket statement that tells the

model what to do with the information that comes next. You can change the bracket statement from 'all' to 'any,' 'none,' or 'not all' by clicking on the 'all' and selecting an option from the drop down menu. But for now let it remain 'all.' Click on the circle to the left of the text, and select 'Add condition.' The condition statement contains the criteria you use to select your releases.

You will see the following text line:

1. Chemical Flags. Year Chemical Added is equal to ____

Click on the first part of the text line, and a drop-down menu will appear. This menu contains all of the variables contained in the model that you can use in your selection statements. They are grouped according to the type of variable. Click on the group 'Submission.' To the right you will see another menu with all of the variables in this group. Click on 'Year.'

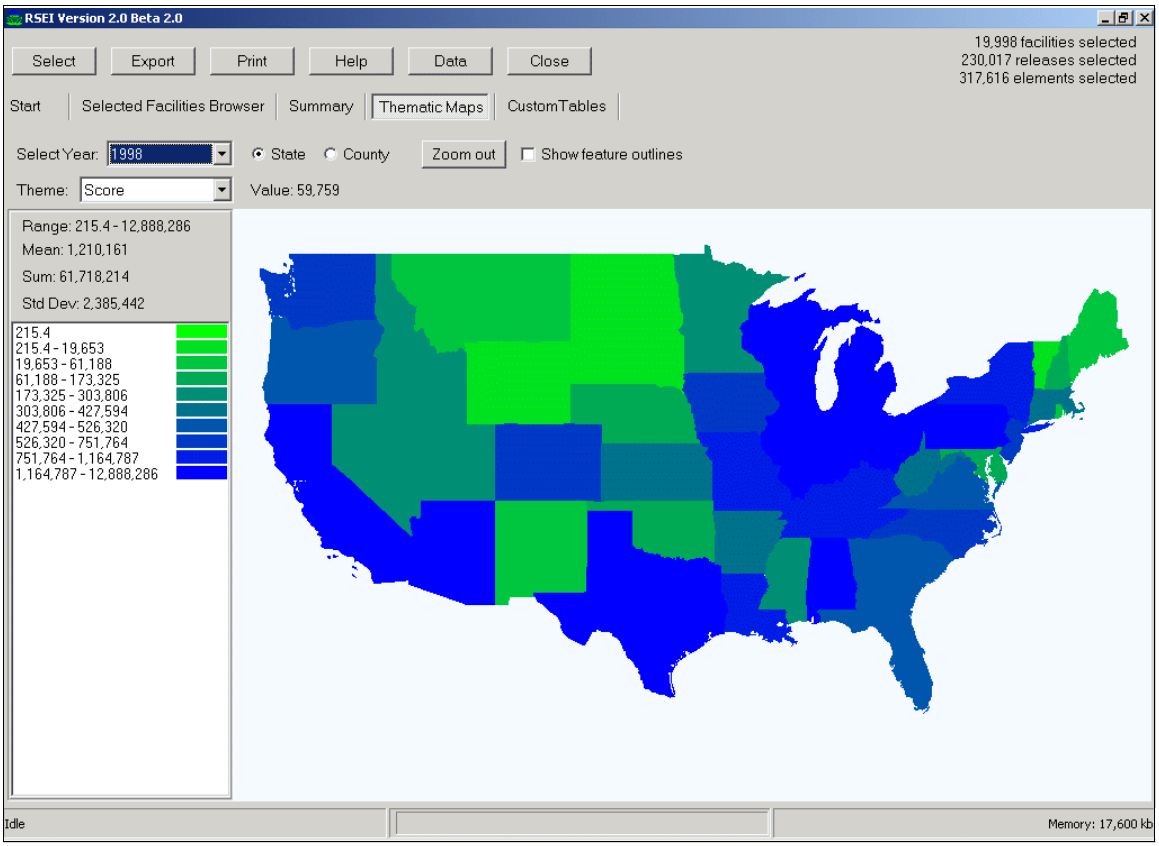


The text line will change to 1. Submission.Year is equal to ____. In the blank at the end of the line, type in' '1998'. This will now select all TRI-reported releases that occurred in 1998. Click somewhere in the window outside of the box you just typed in, so that the entire text line is blue (this enters your change). Click on the **Submit** button at the top of the **Select elements...** screen to submit the selection. The model may take a few minutes to complete the task.

When the model is done with the selection, the **Select elements...** screen will disappear. The number of facilities, chemical releases, and elements that are selected in your set will be displayed in the top right corner of the screen.

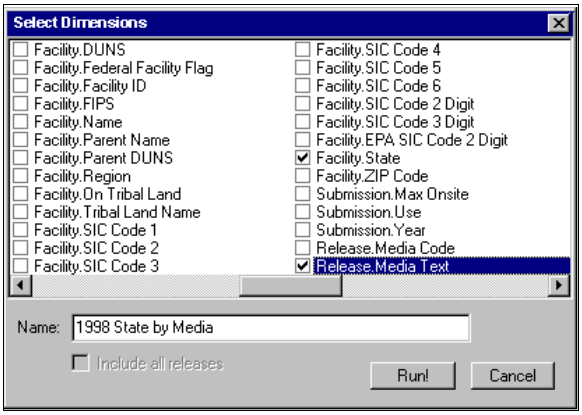
Now that you have your selected set of scores, you can analyze them in different ways.

To get a quick summary of the differences in risk-related impacts between states, click on **Thematic Maps** at the top of the screen. The model will display a U.S. map with variations in color representing differing levels in impacts. Your map may show Alaska and Hawaii; if you want to see only the continental U.S., click and drag the map to the left until Hawaii and Alaska no longer show. The legend at the left side of the screen shows what colors on the map correspond to what values. Make sure that the 'Selected Year' box at the top left shows '1998,' and the 'Theme' box shows 'Score.' If you want to increase the size of the map, draw the outline of a box around the area you want to enlarge with the cursor while holding down the right mouse button.



Thematic Map

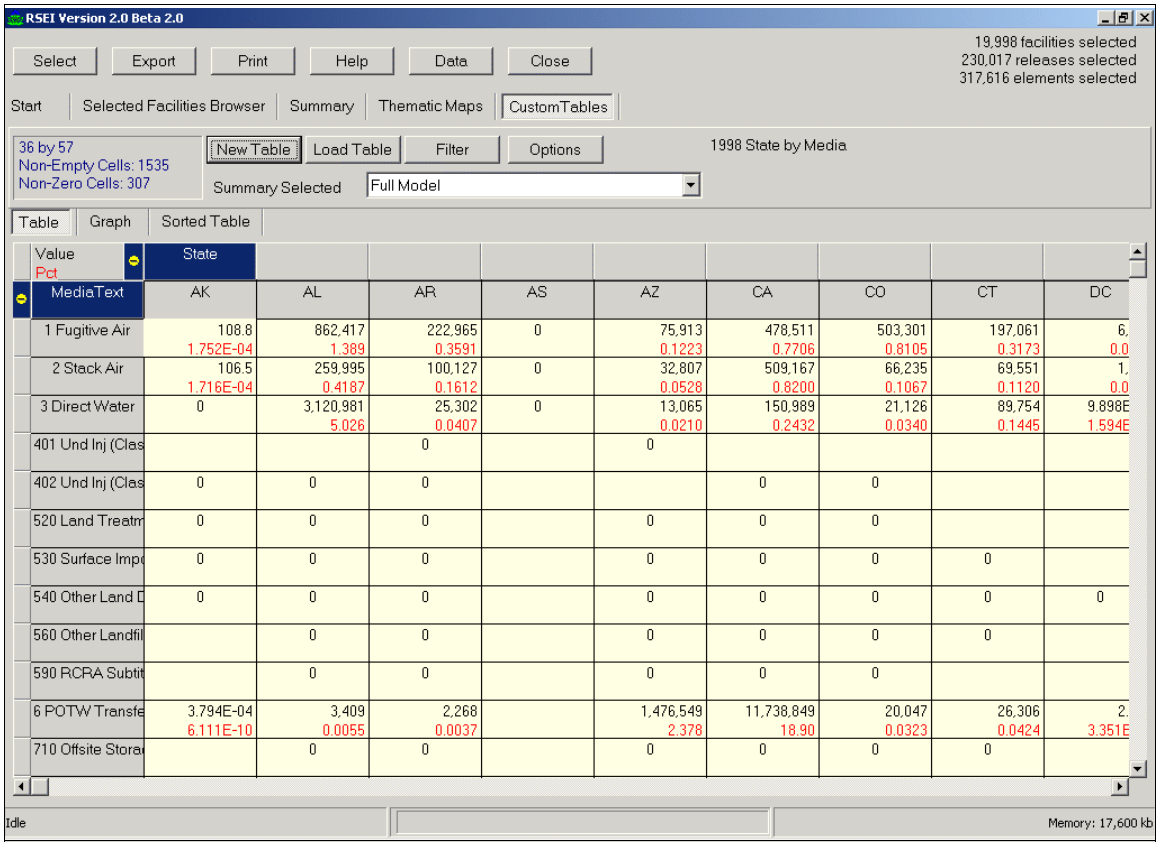
Step 1.2. Results by State



To get a more detailed look at 1998 scores, you can break down your national-level selection by state. Click on the **Custom Tables** button at the end of the second row of menu buttons at the top of the screen, and the screen shown at right will appear.

In this screen you can create and customize crosstab tables, based on any combination of variables you choose. To create a new crosstab table, click on the **New Table** button. The **Select Dimensions** screen will appear. This screen lists all the variables included in the RSEI model. The variables are listed in the form Data table.variable name, where the data table is similar to the variable group used in the **Select elements...** screen. A complete listing of all variables is provided in Chapter 4.

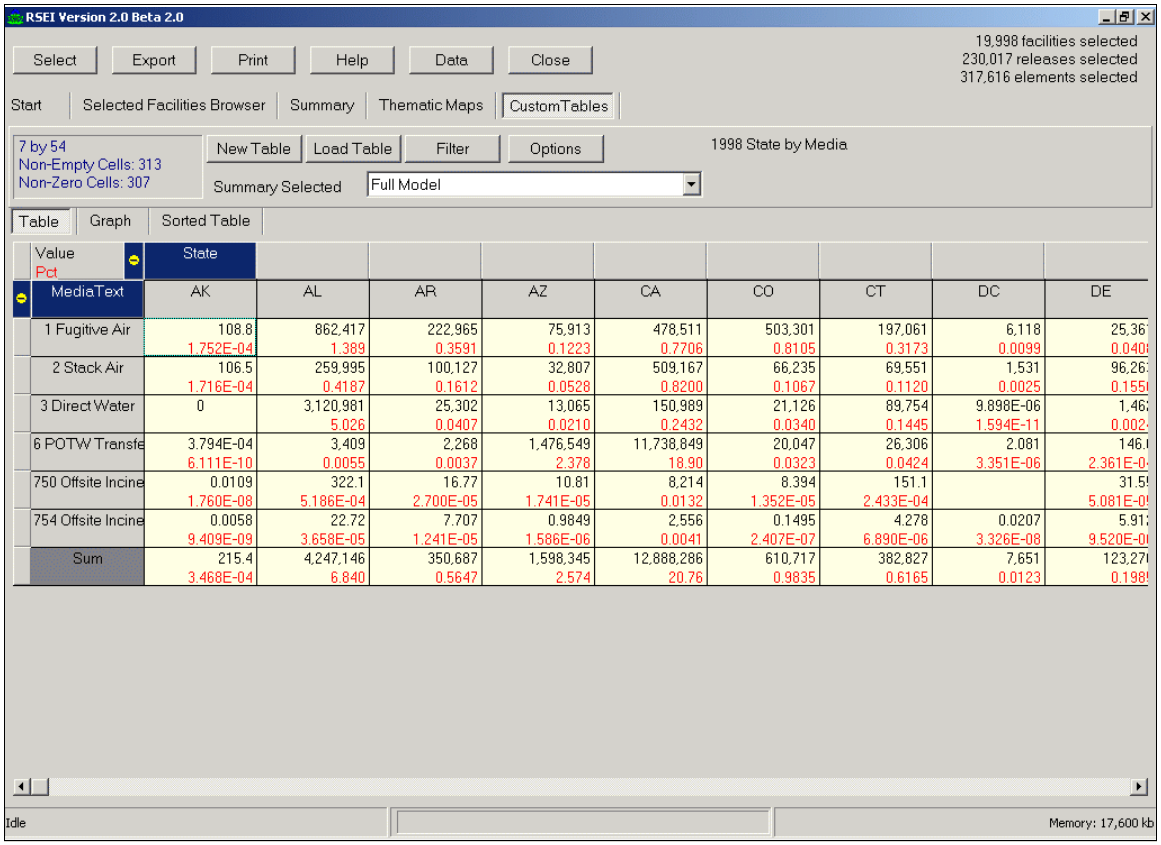
We want to look at state-level results, so select 'Facility.State.' It is often informative to break down results by media, in order to assess what exposure routes are associated with the highest risk-related impacts. So select 'Release. Media Text,' which will provide the text description of the medium into which each chemical is released. In the box to the right of 'Name' at the bottom of the screen, type in a name for this table you are creating, such as '1998 State by Media.' All of the tables you create in the RSEI model are saved on your hard drive in the C:\Program Files\RSEI\User directory for later use. Hit **Run!** and the model will create your crosstab table. It may take a few minutes to generate. When the model is finished, you will see the new crosstab table, as shown below.



Crosstab Table, State by Media

This table shows, for each state, the risk-related score for each medium. This is the top number, in black, in each cell. For cells with non-zero values, the number in red beneath the score is the cell's percentage of the total score of all the cells in the table (the total can be found in the lower right corner). The box at the top of the screen, where 'Full model' is displayed, controls what numbers are shown in black in cells of the table. Explanations of each type of number can be found at the end of Chapter 8. 'Full model' refers to the score: the risk-related, unitless number that takes into account the chemical release, its toxicity, environmental fate and transport, exposure assumptions, and the number of exposed people. The values below the top number in black in each cell can be changed by clicking **Options**, then Cell Display. The default (the value in red) is the 'Total Pct.' To turn it off, simply click on the text so that the check mark is removed.

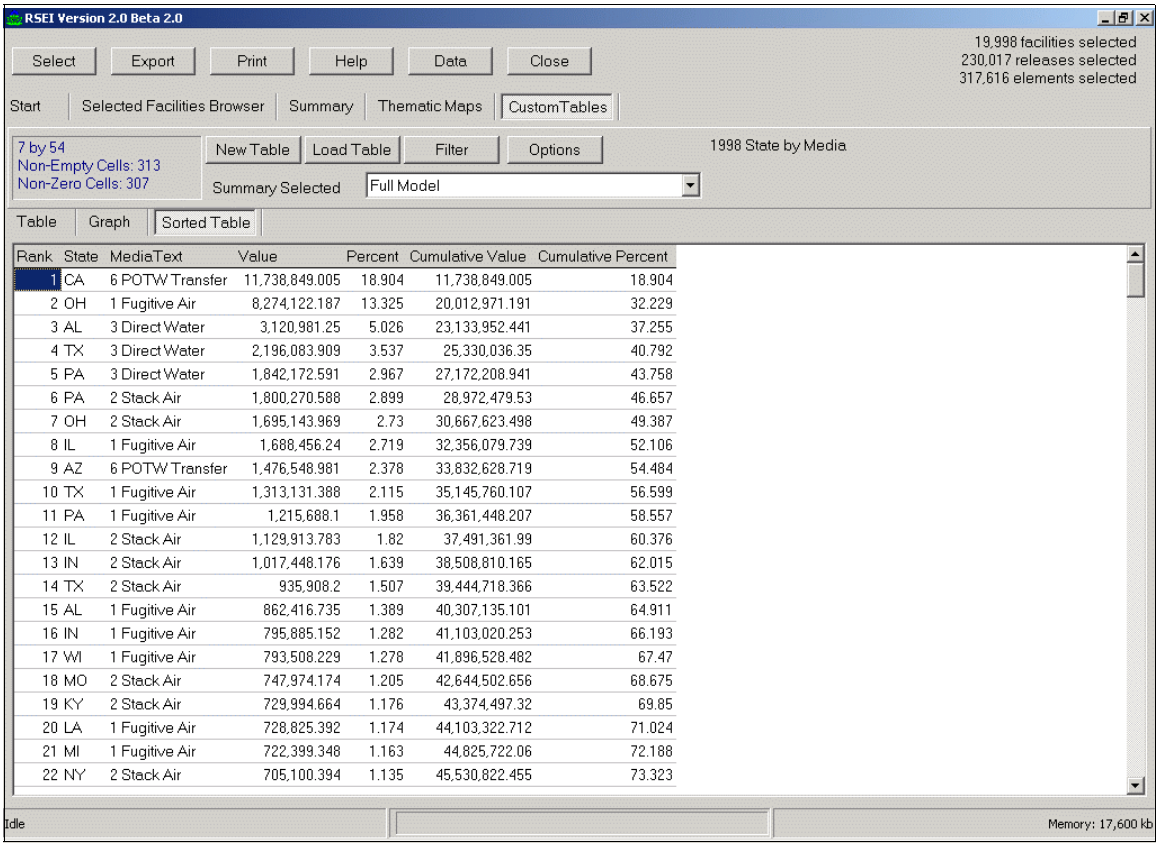
Note that there are many media that have only zeros for entries. To get rid of all entries that have no nonzero values, click on the minus sign to the left of the row header 'Media Text.' This collapses the rows, and the minus sign is replaced with a plus sign. Click on the plus sign to expand the row again; now, however, the zero-only rows will not be displayed.



Crosstab Table, Zero-Only Rows Removed

Any time you change the 'Summary Selected,' you should collapse and expand the rows and columns to refresh the table. Otherwise, rows or columns that were not shown originally because all of the values were zero, may not show when the summary is changed, even if in the new summary their values are non-zero.

Because the crosstab table displays so much information at one time, sometimes it is useful to quickly summarize the information in the table. The **Sorted Table** function works off the crosstab table's current display and shows each cell in descending order. Click on the **Sorted Table** button and the screen shown below will appear.



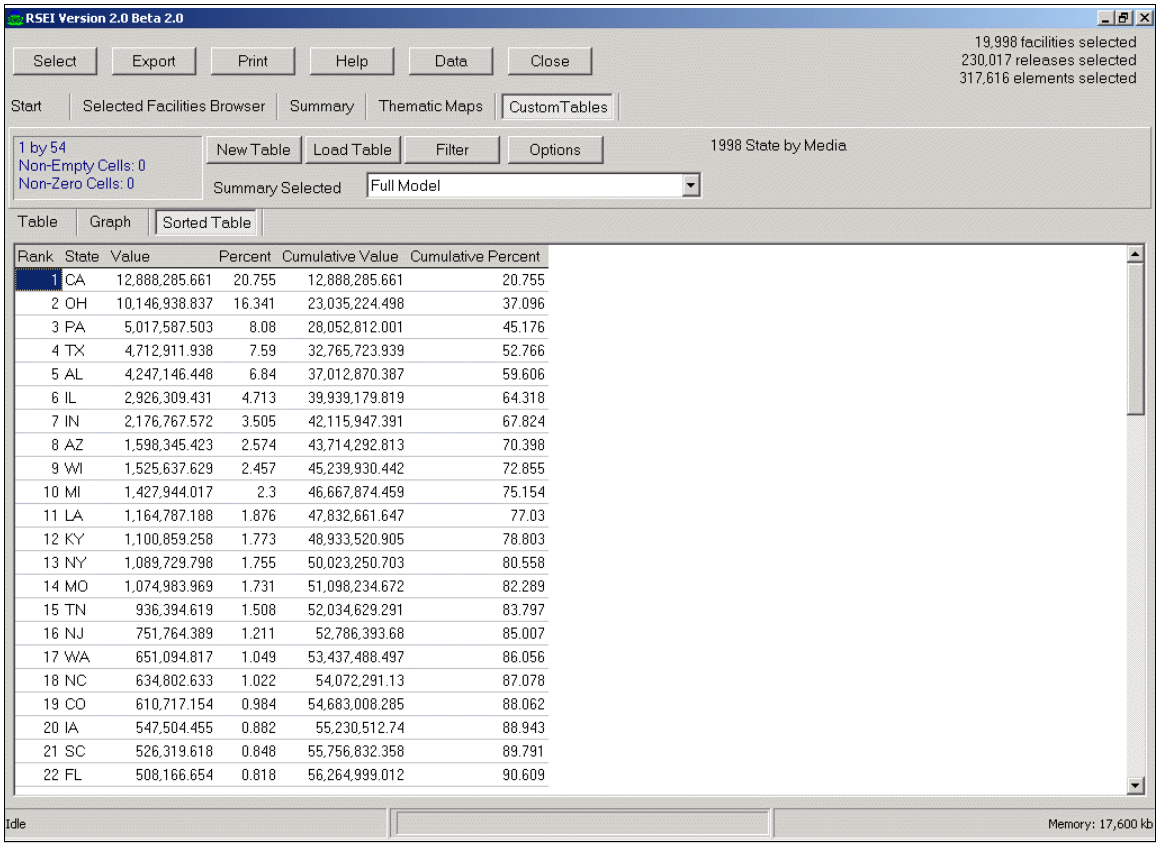
Rank	State	MediaText	Value	Percent	Cumulative Value	Cumulative Percent
1	CA	6 POTW Transfer	11,738,849.005	18.904	11,738,849.005	18.904
2	OH	1 Fugitive Air	8,274,122.187	13.325	20,012,971.191	32.229
3	AL	3 Direct Water	3,120,981.25	5.026	23,133,952.441	37.255
4	TX	3 Direct Water	2,196,083.909	3.537	25,330,036.35	40.792
5	PA	3 Direct Water	1,842,172.591	2.967	27,172,208.941	43.758
6	PA	2 Stack Air	1,800,270.588	2.899	28,972,479.53	46.657
7	OH	2 Stack Air	1,695,143.969	2.73	30,667,623.498	49.387
8	IL	1 Fugitive Air	1,688,456.24	2.719	32,356,079.739	52.106
9	AZ	6 POTW Transfer	1,476,548.981	2.378	33,832,628.719	54.484
10	TX	1 Fugitive Air	1,313,131.388	2.115	35,145,760.107	56.599
11	PA	1 Fugitive Air	1,215,688.1	1.958	36,361,448.207	58.557
12	IL	2 Stack Air	1,129,913.783	1.82	37,491,361.99	60.376
13	IN	2 Stack Air	1,017,448.176	1.639	38,508,810.165	62.015
14	TX	2 Stack Air	935,908.2	1.507	39,444,718.366	63.522
15	AL	1 Fugitive Air	862,416.735	1.389	40,307,135.101	64.911
16	IN	1 Fugitive Air	795,885.152	1.282	41,103,020.253	66.193
17	WI	1 Fugitive Air	793,508.229	1.278	41,896,528.482	67.47
18	MO	2 Stack Air	747,974.174	1.205	42,644,502.656	68.675
19	KY	2 Stack Air	729,994.664	1.176	43,374,497.32	69.85
20	LA	1 Fugitive Air	728,825.392	1.174	44,103,322.712	71.024
21	MI	1 Fugitive Air	722,399.348	1.163	44,825,722.06	72.188
22	NY	2 Stack Air	705,100.394	1.135	45,530,822.455	73.323

Sorted Table, State by Media

This table shows each state-medium combination, listed in descending order of risk-related impact. The sixth column, 'Cumulative Value,' shows the total value of the score for each entry and all of those above it. The 'Cumulative Percent' column functions in a

similar way. You can see that releases to Publicly-Owned Treatment Works (POTWs) in California account for almost19 percent of the total risk-related impact in the country.

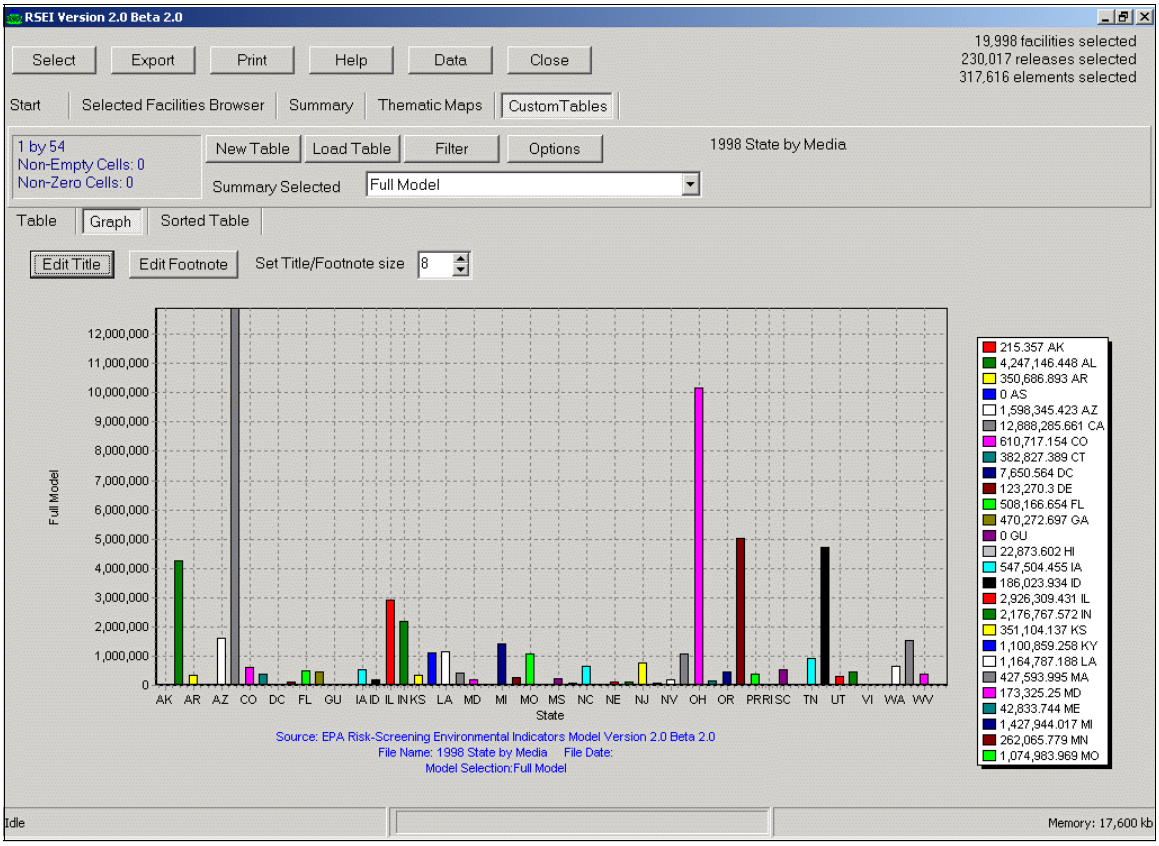
To do a more direct comparison of states, go back to the custom table by clicking on the **Table** button. Collapse the rows by clicking on the minus sign to the left of the 'Media Text' row header. Then click on the **Sorted Table** button again. This time, instead of showing state-media combinations, the table only shows the state rankings. You can see that California is the state with the highest calculated risk-related impact, accounting for almost 21 percent of the nation's total.



Rank	State	Value	Percent	Cumulative Value	Cumulative Percent
1	CA	12,888,285.661	20.755	12,888,285.661	20.755
2	OH	10,146,938.837	16.341	23,035,224.498	37.096
3	PA	5,017,587.503	8.08	28,052,812.001	45.176
4	TX	4,712,911.938	7.59	32,765,723.939	52.766
5	AL	4,247,146.448	6.84	37,012,870.387	59.606
6	IL	2,926,309.431	4.713	39,939,179.819	64.318
7	IN	2,176,767.572	3.505	42,115,947.391	67.824
8	AZ	1,598,345.423	2.574	43,714,292.813	70.398
9	WI	1,525,637.629	2.457	45,239,930.442	72.855
10	MI	1,427,944.017	2.3	46,667,874.459	75.154
11	LA	1,164,787.188	1.876	47,832,661.647	77.03
12	KY	1,100,859.258	1.773	48,933,520.905	78.803
13	NY	1,089,729.798	1.755	50,023,250.703	80.558
14	MO	1,074,983.969	1.731	51,098,234.672	82.289
15	TN	936,394.619	1.508	52,034,629.291	83.797
16	NJ	751,764.389	1.211	52,786,393.68	85.007
17	WA	651,094.817	1.049	53,437,488.497	86.056
18	NC	634,802.633	1.022	54,072,291.13	87.078
19	CO	610,717.154	0.984	54,683,008.285	88.062
20	IA	547,504.455	0.882	55,230,512.74	88.943
21	SC	526,319.618	0.848	55,756,832.358	89.791
22	FL	508,166.654	0.818	56,264,999.012	90.609

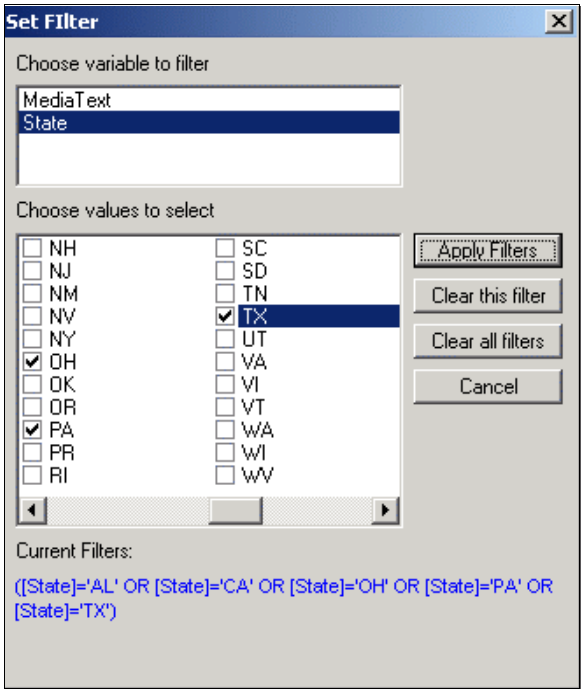
Sorted Table, by State Only

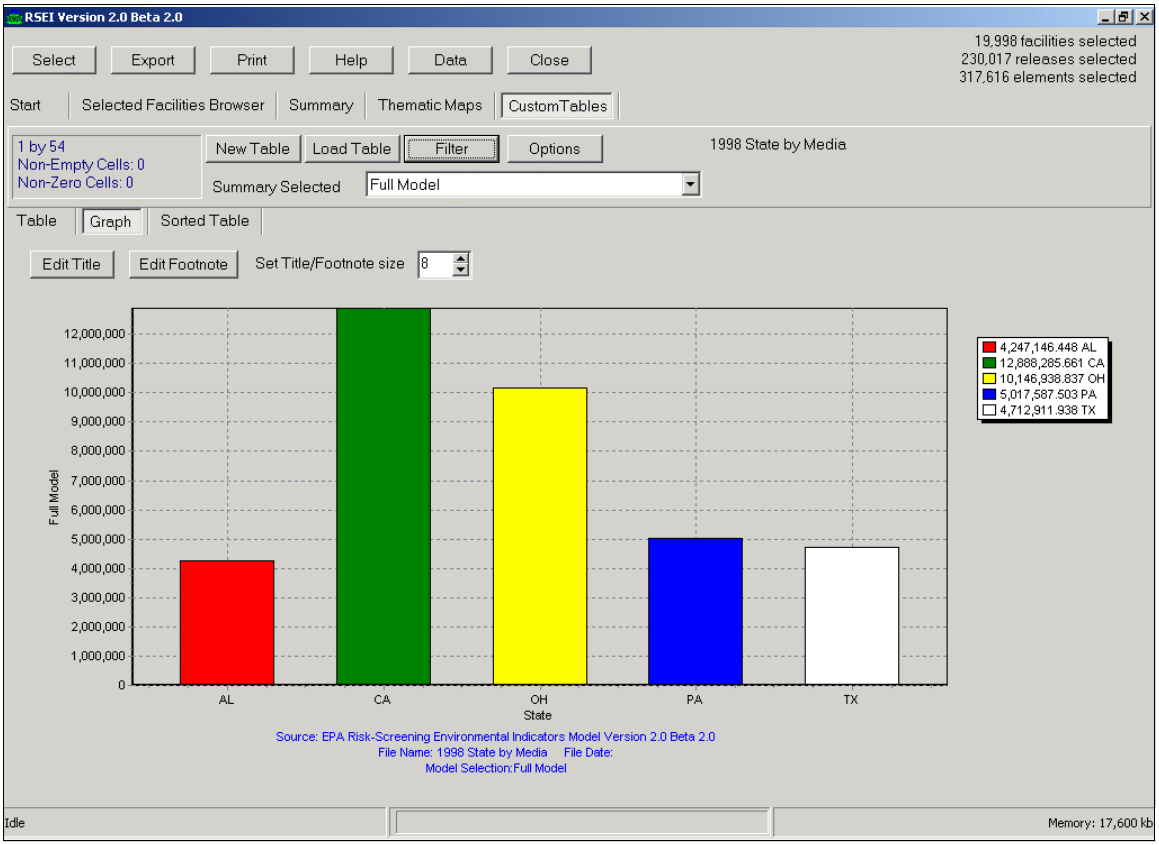
You can also look at the results graphically. Click on the **Graph** button above the table, and the following screen will appear:



Custom Graph, Total for All Media for All States

This graph is slightly busy, due to the number of states shown. To limit the number of states, perhaps to just those listed in the top 5 positions in the **Sorted Table**, go back to the Table screen, by clicking on the **Table** button. Click the **Filter** button at the top of the screen, and the **Set Filter** screen will appear. Click on State, then click on the boxes next to the top five states: CA, OH, PA, TX and AL. Click 'Apply Filters' and the table will then display only those states with checked boxes. Then click on **Graph**, and the graph will also display only the total for all media for those states, resulting in a more easily intelligible graph.





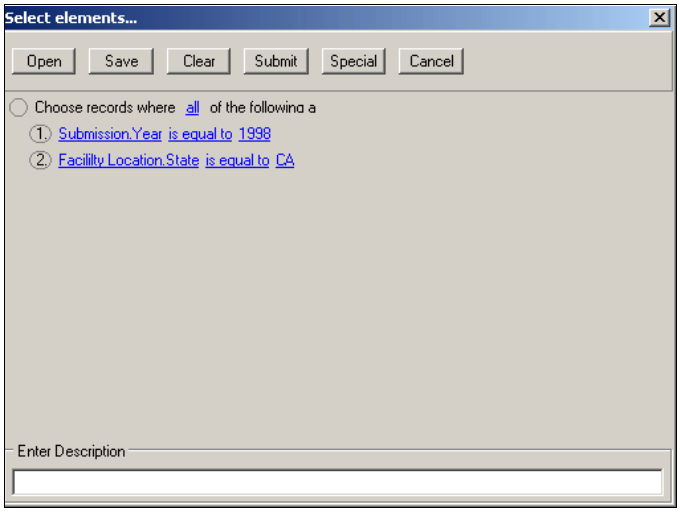
Custom Graph, Total for All Media for Top 5 States

This tutorial began with a national-level analysis, then narrowed in on the top five states by risk-related impacts. The next tutorial will narrow the analysis even further, looking more closely at one state.

Tutorial 2. State-Level Analysis

Now you can take a closer look at California, and what comprises its score. We know from looking at the first sorted table that stack and fugitive air media account for most of the risk-related impacts. But what chemicals are mostly responsible for these impacts?

Step 2.1. Perform a State-Level Selection for California



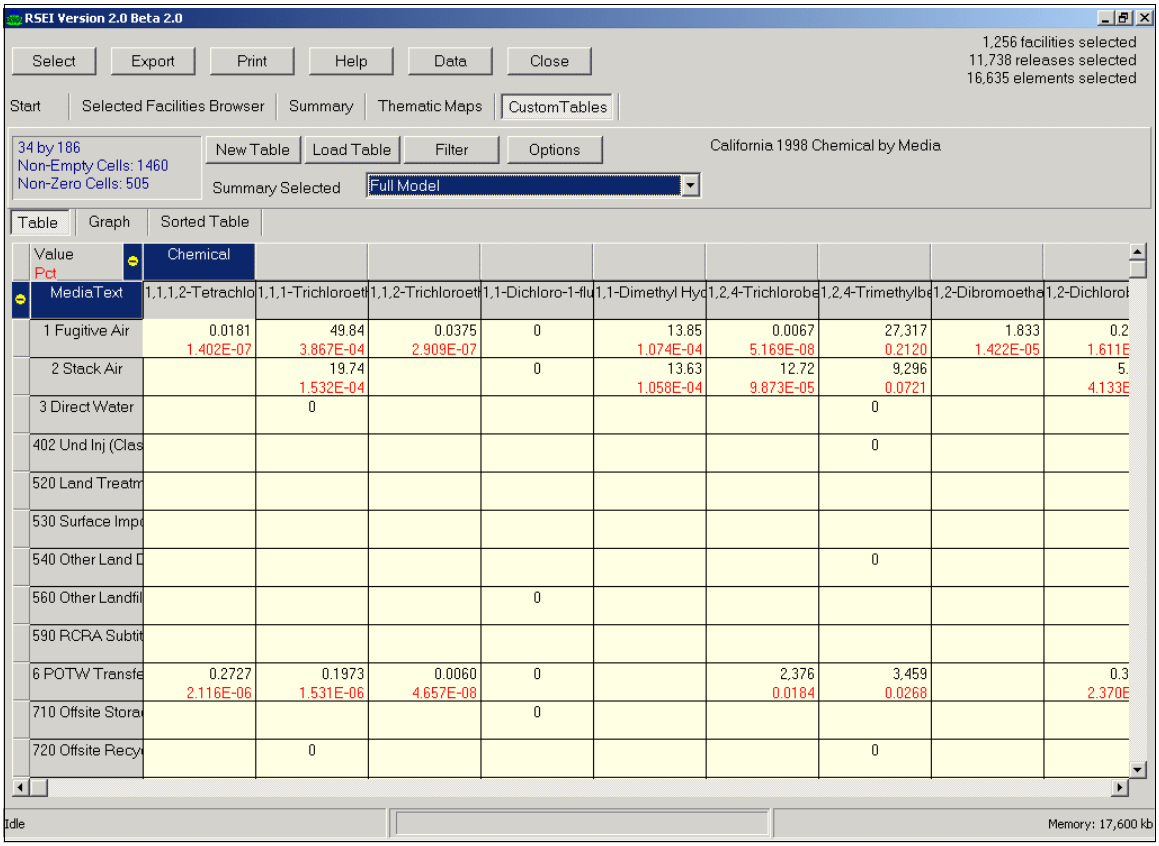
First, limit your selected set to releases from facilities located in California by performing a new selection. Click on the **Select** button. The screen should display your last selection, which was 'Submission.Year is equal to 1998.' To add another condition statement, click on the '1' to the left of 'Submission,' then click 'Add Condition.' A new text line will appear. Click on 'Chemical Flags.Year Chemical Added,' then click on 'Facility Location,' then 'State.' In the blank at the end of the line, type in the abbreviation for California, 'CA.' Click somewhere else in the window aside from the box you just typed in, to enter your change (all of the text in the line will then turn blue). Your selection statement should look like the one to the right. Click **Submit.** The model may take a few minutes to complete the task.

When the model is done with the selection, the **Select elements...** screen will disappear. The number of facilities, chemical releases, and elements that are selected in your set will be displayed in the top right corner of the screen.

Step 2.2. Results for California, Chemical by Media

Click on the **Custom Tables** button at the end of the second row of menu buttons at the top of the screen. Now we will look at what chemicals are being released by facilities in California, and the media into which they are released. Click **New Table**, and select 'Chemical.Chemical,' and 'Release.Media Text.' The selections for your previous table will still be displayed, so make sure to deselect them. Similarly, the name of the previous table will be displayed in the 'Name' box at the bottom of the screen. Delete that name,

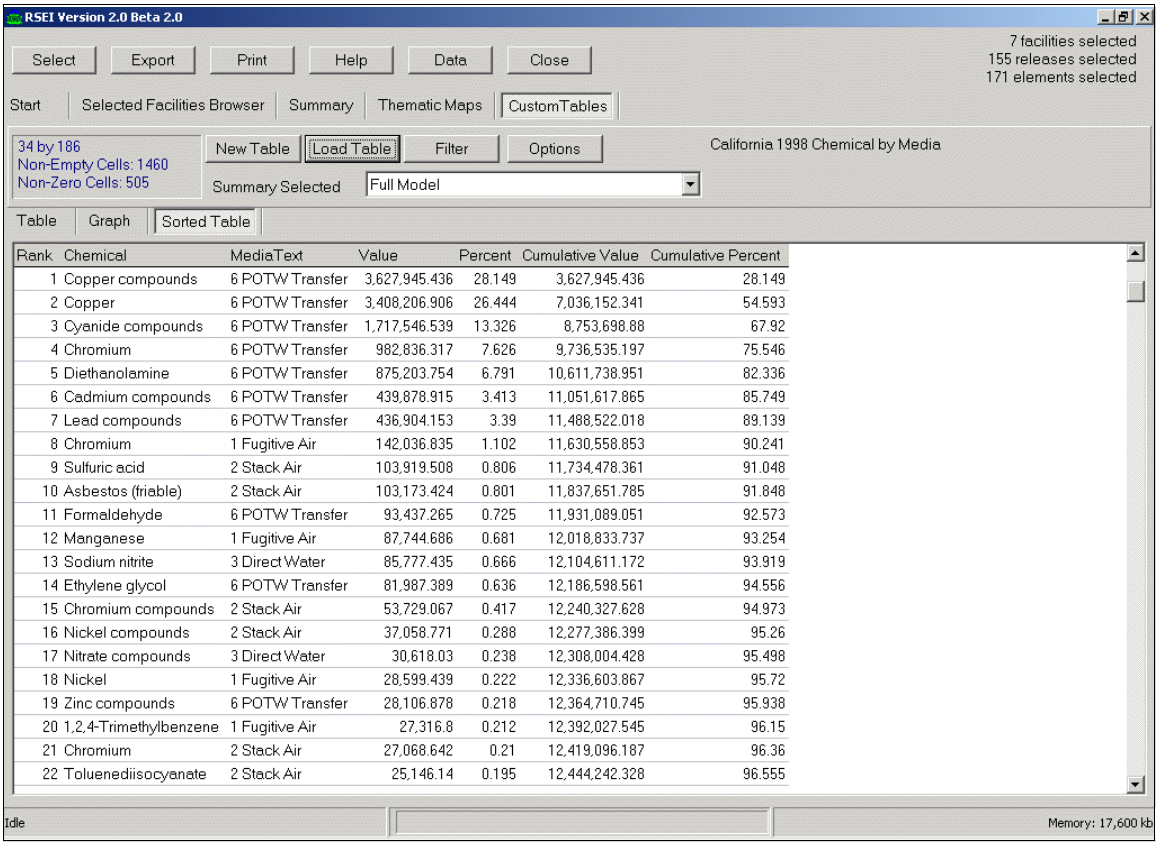
and type in a new name for this table, for instance, 'California 1998 chemical by media.' Hit **Run!** and the model will create your new table. The table may take a few minutes to generate; when it does you will see the following screen:



Crosstab Table, Chemical by Media for California, 1998

If you do not see the rows, click on the plus sign to the right of the first chemical. Each cell of this table shows the risk-related score for each chemical-medium combination in California.

To get an idea of the relative contribution of each combination, click on **Sorted Table.** This table shows the individual and cumulative contribution of each chemical-medium combination to the total risk-related impact in California, in descending order.

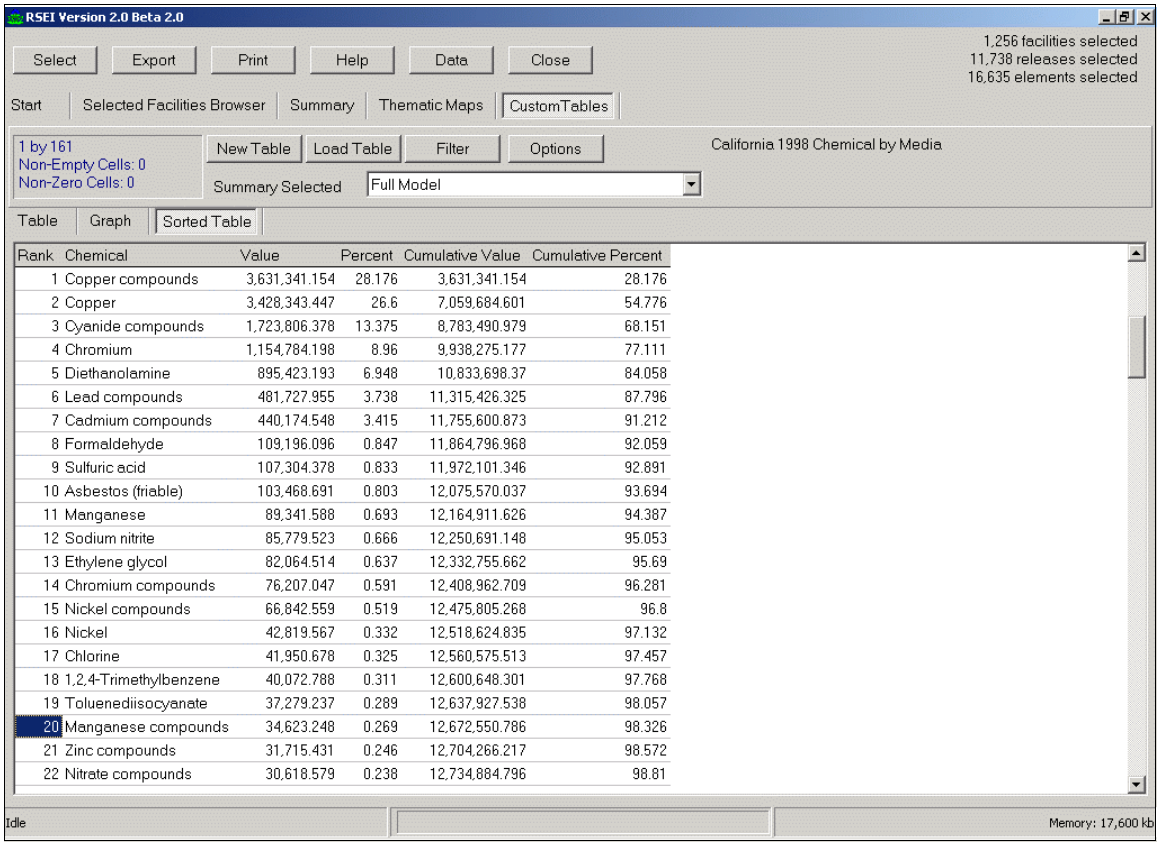


Rank	Chemical	MediaText	Value	Percent	Cumulative Value	Cumulative Percent
1	Copper compounds	6 POTW Transfer	3,627,945.436	28.149	3,627,945.436	28.149
2	Copper	6 POTW Transfer	3,408,206.906	26.444	7,036,152.341	54.593
3	Cyanide compounds	6 POTW Transfer	1,717,546.539	13.326	8,753,698.88	67.92
4	Chromium	6 POTW Transfer	982,836.317	7.626	9,736,535.197	75.546
5	Diethanolamine	6 POTW Transfer	875,203.754	6.791	10,611,738.951	82.336
6	Cadmium compounds	6 POTW Transfer	439,878.915	3.413	11,051,617.865	85.749
7	Lead compounds	6 POTW Transfer	436,904.153	3.39	11,488,522.018	89.139
8	Chromium	1 Fugitive Air	142,036.835	1.102	11,630,558.853	90.241
9	Sulfuric acid	2 Stack Air	103,919.508	0.806	11,734,478.361	91.048
10	Asbestos (friable)	2 Stack Air	103,173.424	0.801	11,837,651.785	91.848
11	Formaldehyde	6 POTW Transfer	93,437.265	0.725	11,931,089.051	92.573
12	Manganese	1 Fugitive Air	87,744.686	0.681	12,018,833.737	93.254
13	Sodium nitrite	3 Direct Water	85,777.435	0.666	12,104,611.172	93.919
14	Ethylene glycol	6 POTW Transfer	81,987.389	0.636	12,186,598.561	94.556
15	Chromium compounds	2 Stack Air	53,729.067	0.417	12,240,327.628	94.973
16	Nickel compounds	2 Stack Air	37,058.771	0.288	12,277,386.399	95.26
17	Nitrate compounds	3 Direct Water	30,618.03	0.238	12,308,004.428	95.498
18	Nickel	1 Fugitive Air	28,599.439	0.222	12,336,603.867	95.72
19	Zinc compounds	6 POTW Transfer	28,106.878	0.218	12,364,710.745	95.938
20	1,2,4-Trimethylbenzene	1 Fugitive Air	27,316.8	0.212	12,392,027.545	96.15
21	Chromium	2 Stack Air	27,068.642	0.21	12,419,096.187	96.36
22	Toluenediisocyanate	2 Stack Air	25,146.14	0.195	12,444,242.328	96.555

Sorted Table, Chemical by Media for California, 1998

You can see from this table that 28 percent of the calculated score in California for 1998 is due to POTW releases of copper compounds. Approximately 68 percent of the total score for California results from the top three chemicals, copper compounds, copper, and cyanide compounds.

To look at the rankings only be chemical, go back to the **Table** screen and collapse the rows by clicking on the minus sign to the left of 'Media Text', and then click again on the **Sorted Table** button, as we did in Tutorial 1. The table is shown below. You can see that, when releases to all media are considered, the ranking is largely similar, and copper, copper compounds and cyanide compounds account for 68 percent of the total score in California in 1998.



Sorted Table, Chemical Only for California, 1998

Step 2.3. Time Trend Analysis for High-Ranking Chemicals

You might want to see the trend in the releases of these high-ranking chemicals over several years, to see if releases and scores are increasing or decreasing. To do this, begin by modifying the last selection statement to limit the selected set to releases of these chemicals only. Click on the **Select** button to return to the **Select elements...** screen. The two statements used in the previous selection will still be showing. Click on the circle to left of the first line, and then click on 'Add Bracket.' The text line, 'all of the following apply,' will appear. This is a bracket statement telling the model how to interpret the list of conditions that will follow. We are going to add a list of three chemicals, and we want releases for any of them to be selected, so click on 'all' and then click on 'any' in the drop down list. The text line should now say 'any of the following apply.'

You will now add your list of chemicals. Click on the text, 'Chemical Flags. Year Chemical Added,' and then click on 'Chemical Identifiers,' then 'Chemical.' 'Chemical Identifiers.Chemical' will show in the text line. Click on the blank at the end of the text line, and a screen will pop up that lists all of the chemicals included in the RSEI model. Scroll through the list until you come to the first chemical to select, Copper compounds. Click on that chemical, and it will appear in the text line in your selection statement. Click on the '3.1' at the beginning of the line, and click 'Add Condition.' Repeat these steps to select 'Copper' and 'Cyanide compounds.'

In order to look at time trends, you need to make another modification to your selection statement. In the first condition statement, which says 'Submission.Year is equal to 1998, click on the 'is equal to.' Click on 'is between' in the drop down menu. The text line should now say 'Submission.Year is between 1998 and ___. In the first blank, change 1998 to 1995, and add 1998 in the second blank. The model will now select any releases of the three chemicals in California in the years 1995 through 1998. Note that the 'is between' operator is inclusive.

Because you are doing a time trend, it is important not to inadvertently introduce other factors into your analysis. For Reporting Year 1998, TRI added a number of new industries that had not previously been required to report to TRI. If these facilities are not accounted for in the time trend analysis, the results for 1998 will look much higher than those for previous years, simply because more facilities are included. If you exclude the new reporters, you will be working with the same set of facilities for all years, and so will get a more accurate sense of the trend over time.

To exclude these facilities, create a new bracket statement by clicking on the empty circle to the left of the first line again, and clicking on 'Add Bracket.' In the new line that appears, change the 'all' to 'none.' Click on the first part of the new condition statement, and select 'Facility Industry,' then 'SIC Code 1.' Click on the blank space at the end of the line, and in the window that appears, select the first code, 1021 [Copper Ores]. Then add a new condition by clicking on the '4.1' at the beginning of the line, and repeat the same steps, but instead selecting 1031 in the SIC code window. Do this for each of the following SIC codes: 1041, 1044, 1061, 1099, 1221, 1222, 1231, 4911, 4931, 4939, 4953, 5169, 5171, and 7389. Your selection statement should look like the one below.

F Choose records where all of the following apply
1. Submission.Year is between 1995 and 1998
2. Facility Location.State is equal to CA
3. any of the following apply

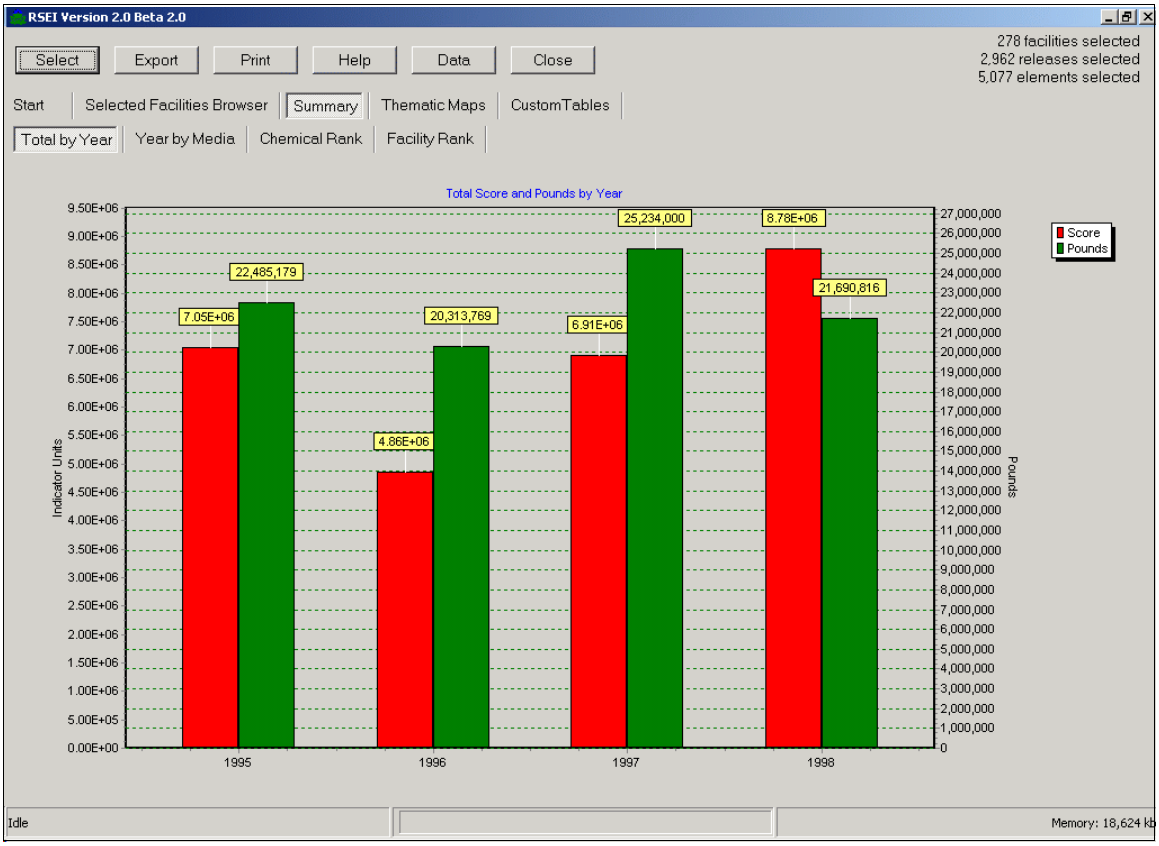
   3.1. Chemical Identifiers.Chemical is equal to Copper compounds
   3.2 Chemical Identifiers.Chemical is equal to Copper
   3.3. Chemical Identifiers.Chemical is equal to Cyanide compounds
4. none of the following apply
   4.1. Facility Industry.SIC Code 1 is equal to 1021
   4.2. Facility Industry.SIC Code 1 is equal to 1031
   4.3. Facility Industry.SIC Code 1 is equal to 1041
   4.4. Facility Industry.SIC Code 1 is equal to 1044
   4.5. Facility Industry.SIC Code 1 is equal to 1061
   4.6. Facility Industry.SIC Code 1 is equal to 1099
   4.7. Facility Industry.SIC Code 1 is equal to 1221
   4.8. Facility Industry.SIC Code 1 is equal to 1222
   4.9. Facility Industry.SIC Code 1 is equal to 1231
   4.10. Facility Industry.SIC Code 1 is equal to 4911
   4.11. Facility Industry.SIC Code 1 is equal to 4931
   4.12. Facility Industry.SIC Code 1 is equal to 4939
   4.13. Facility Industry.SIC Code 1 is equal to 4953
   4.14. Facility Industry.SIC Code 1 is equal to 5169
   4.15. Facility Industry.SIC Code 1 is equal to 5171
   4.16. Facility Industry.SIC Code 1 is equal to 7389

Because this is an intricate and useful query, it is a good idea to save it for later use. Type in a description, such as 'California, 1995-1998 copper copper compounds and cyanide compounds excluding new reporters,' in the white box at the bottom of the window. This is a text description that will be saved with your query. Click on 'Save' at the top of the window, and enter a shorter name for your query, such as 'CA Cu_cyan 95-98 exc new.' The model will automatically add a '.qry' extension to your selection name. In the future you can load this query and either resubmit it, or use it as the basis for building new selection statements.

Click **Submit**, and the model will perform the selection. The model may take a few minutes to complete the task. When the model is done with the selection, the **Select elements...** screen will disappear. The number of facilities, chemical releases, and elements that are selected in your set will be displayed in the top right corner of the screen.

One of the quickest ways to look at a trend over time is to use the preformatted graphs provided. Click on the **Summary** button in the second row of menu buttons, then **Total by Year**. This graph adds together all of the pounds and the scores of all of the chemical releases in the selected set and presents them separately for each year in the set. In this

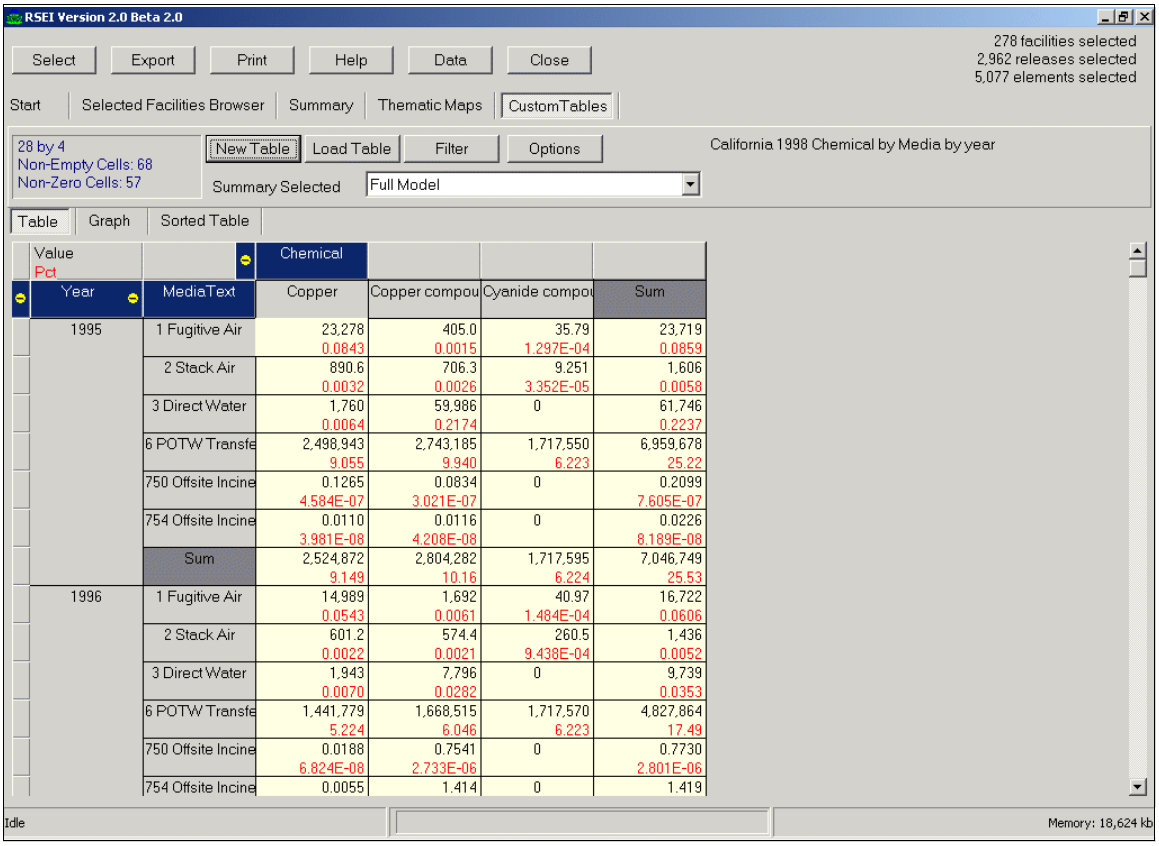
case, it would be all of the chemical releases of copper, copper compounds and cyanide compounds in California, excluding the new reporters. The graph is shown below. Pounds (as reported in TRI) are shown in green, and correspond to the axis on the right side of the graph; the total score is shown in red and corresponds to the axis on the left side of the graph. You can see that pounds have fluctuated over the period, but scores have risen steadily from 1996 to 1998, after dipping the first year.



Total by Year Graph for Selected Chemicals in California, 1995-1998

To try to identify the reason for the increased score in 1998, you can create a new custom table by chemical by media by year. Click on the **Custom Tables** button, and then **New Table.** In the list of dimensions, select Chemical.Chemical, Submission.Year, and Release.MediaText. Make sure to deselect any selections from previous runs. In the 'Name' box, type 'California 1995-1998 chemical by media by year.' Click **Run!** and

your table will generate (this may take a few minutes). Once the query is finished, click on **Table**. The table should look like the one shown below. If you do not see media listed, click on the plus sign to the right of 'Year,' and the rows showing media will be expanded.



Crosstab Table, Chemical by Media by Year for California, 1995-1998

For now, collapse the rows showing media again. Now you can look just at the scores for chemicals by year. Looking at the totals, it is clear that the increase in score from 1996 to 1998 is due to an increase in scores for both copper and copper compounds, which dropped from 1995 to 1996,a nd increased from 1996 to 1998. If you now expand the rows showing media, you can further identify the reason for the increase. Looking at just the media to which copper and copper compounds were released, you can see that the changes in score are due to increases in the score for POTW releases for both chemicals.

You can also export this table, in order to do calculations in a spreadsheet, for example. While viewing your table, simply click on **Export** in the top row of menu buttons, and select the type of file you would like your table to be exported to. Click on the folder icon to the right of the'Export to File' box at the bottom of the window, and select the directory in which you would like to store your exported file C:\Program Files\RSEI\Work is a convenient place to store files, but you can export the file anywhere. Enter a name at the bottom of the screen and click **Save**. In the **Setup of the data export** screen, click OK, and the model will export your table. You can then open up the file in whatever program you selected.

The **Table**, **Graph** and **Sorted Table** functions will always display results based on the last crosstab table that was generated. Even if you perform a new selection using the **Select** button, these functions will not change until you create a new table based on your new selection.

Step 2.4. Further Analyses

If you wish to determine what facilities released copper, copper compounds or cyanide compounds, you could go back to the **Select elements...** screen and add a condition statement by clicking on the first empty circle. Modify the condition to read, 'Release.Media Code is equal to 6.' This will change your selection to only POTW releases. Then you could create a new Custom Table showing Facility Name by Year. This would show you which facilities released these chemicals as releases to POTWs from 1995 to 1998.

Tutorial 3. Finding Facility-Level Information

This tutorial will explain some of the facility-specific features in the RSEI model, including GIS capabilities.

Step 3.1. Select a Group of Facilities

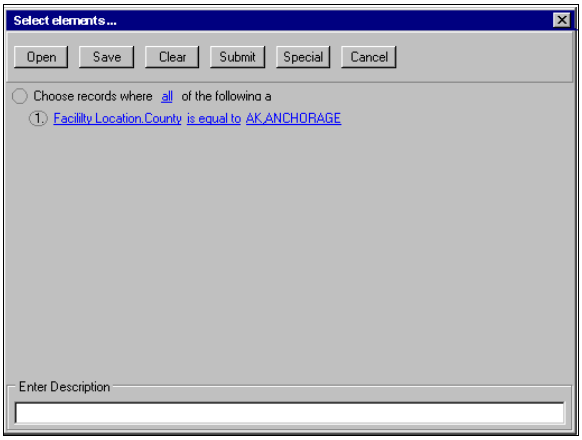
In this step, you will make a selection based on the county where the releasing facilities are located.

Click on the **Select** button at the top left of the menu panel. This brings up the **Select elements...** screen, where you can specify what TRI releases you want to select. Note that if you have performed any selections since installing the RSEI model, your last selection statement will appear on the **Select elements...** screen. To remove it, simply click on the **Clear** button. You will see a line of text on the screen, 'Choose records where all of the following apply'. This is a bracket statement that tells the model what to do with the information that comes next. You can change the bracket statement from 'all' to 'any,' 'none,' or 'not all.' But for now let it remain 'all.' Click on the circle to the left of the text, and select 'Add condition.' The condition statement contains the criteria you use to select your releases.

You will see the following text line:
1. Chemical Flags. Year Chemical Added is equal to ___

Click on the first part of the text line, and a drop-down menu will appear. This menu contains all of the variables contained in the model that you can use in your selections. They are grouped according to the type of variable. Because we are selecting releases for facilities in a certain place, click on the variable group 'Facility Location.' To the right you will see another menu with all of the variables in this group. Click on 'County.'

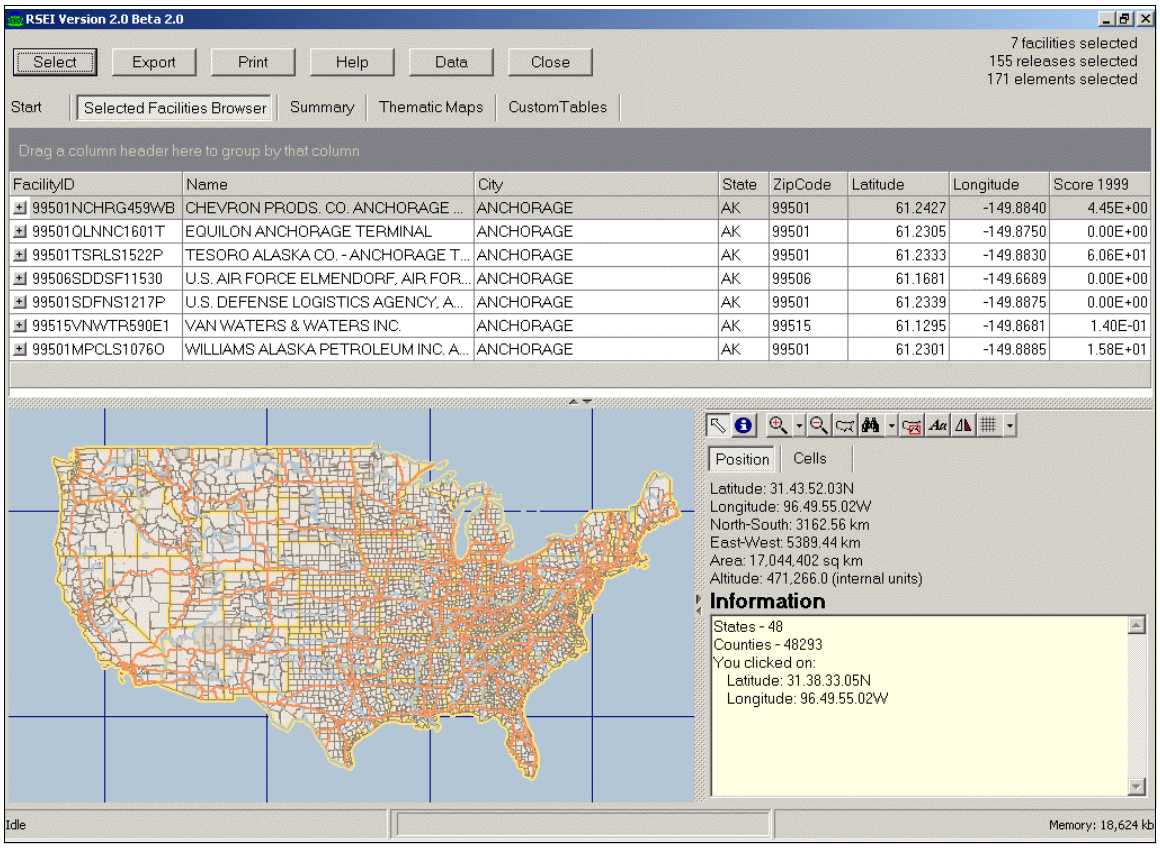
The text line will change to '1. Facility Location.County is equal to ___.' Click on the blank at the end of the statement. In the window that appears, select the county (they are grouped alphabetically by state abbreviation). For this exercise, click on the first county,



AK,ANCHORAGE. This is your completed selection statement, as shown at right. Click **Submit** at the top of the **Select elements...** screen, and the model will perform the selection. This may take a few minutes to finish.

When the model is done with the selection, the **Select elements...** screen will disappear. The number of facilities, chemical releases, and elements that are selected in your set will be displayed in the top right corner of the screen. These numbers will remain displayed until you select a new set of scores. If you forget what your selection statement was, click on these numbers, and a window will appear with your original statement.

Now we can look at all of the facilities whose scores you have just selected. Click on the **Selected Facilities Browser** button in the second line of the menu panel. You will see a screen with three parts. The parts work together to provide detailed information on the facilities you have selected. The top part of the screen lists all the facilities whose scores have been selected. The bottom left is a U.S. map you can use to display your selected facilities and other options. The bottom right of the screen displays information about the current map display and provides the buttons used to navigate the map and control its functions.



The Selected Facilities Browser

Step 3.2. Getting Information About a Facility

Facility Information, Submissions, Releases and Scores

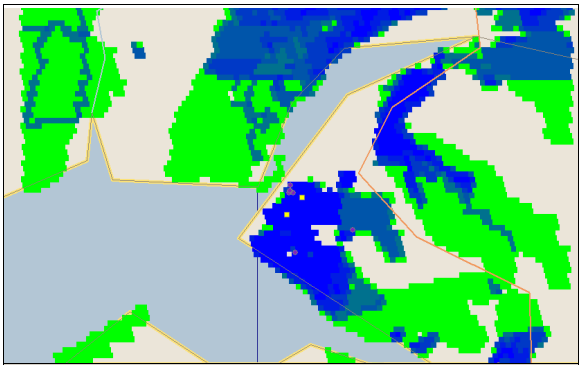
Double-click on the first facility name in the selected facilities list. You will see two options, 'Submissions' and 'Full Facility Record.' The latter option provides all of the information included in the model about this facility– its address, stack parameters, public contacts, etc. Double-click on 'Full Facility Record' or click on the plus sign to the left of the text to see all of the information. Then click on the minus sign at the far left to collapse it again. Expand the 'Submission' option shows each chemical release that this facility has submitted to TRI. Double-click on a chemical name, then expand the'Releases' option, and the model will show you the releases of that chemical– that is, the media that the chemical is being released to, as well as the total pounds released, and

the total score. Double-click on the name of the media, and then on 'Scores' and the model will show you the score (the full risk-related model results) for that chemical release to that media. To hide any of these records, simply click on the small minus sign at the beginning of the row. The list works like a directory tree that you can expand and collapse to see different levels.

Facility Location 

You can also see where on the map your facility is located. With the facility name, or any part of the facility's submission record highlighted, click on the facility location icon in the lower right portion of your screen. The map will zoom into the state where your facility is located, and show you its exact location with concentric circles. If you click on the arrow to the right of the facility location icon, then 'Stream path', the map will also display the nearest stream reach to that facility, and its path out to a larger receiving waterbody (such as a river, lake or ocean). If the facility ships waste to a landfill, POTW (Publicly Owned Treatment Works), or other offsite facility, you can click on the 'Receiving Facility' option in the same menu to have the map zoom in on that facility. Similarly, you can map its stream path. If there is no associated receiving facility, the model will do nothing. TRI reporting facilities are shown as circles, and offsite (receiving) facilities are shown as squares. If you are not zoomed in close enough for the model to graph the stream path, when you click on that function, the model will just show you the concentric circles identifying where your facility is located. Zoom in on the area to see the stream path by clicking on the  icon.

Population Around the Facility 

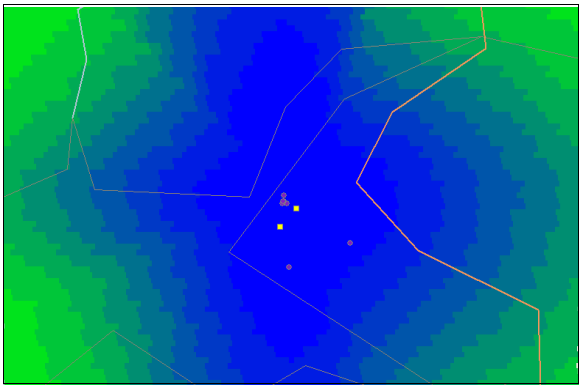


By using the grid icon in the bottom right portion of your screen, you can map the population distribution around your facility. Click on the down arrow to the right of the icon, then select 'Population.' The map will show the population density in shades of green to blue, where blue is the most densely populated. The bottom right portion of the screen shows the legend, the name of the facility around which the population is being mapped, and the range, mean, sum, and standard deviation of the distribution. These statistics relate to the 1 km by 1 km grid cells which form the geographic basis of the model. For instance, if the legend displays 1.000-6.000 for a certain shade of blue, that means that all

of the grid cells colored that shade have between 1 and 6 people in them.

Air Concentrations Around the Facility 

You can also use the grid icon to model air concentrations. Go to the list of selected facilities at the top, and click on a entry in the 'Releases' level (click on 'Submissions,' then click on a chemical, then select a release). It must be either a stack or fugitive air release to be mapped. Once you have selected one, then click on the 'Concentration' option in the same drop-down menu to the right of the grid icon. The model will display the distribution of air concentrations (in $\mu g/m^3$) of that release around the facility. Areas of higher concentration are shown in blue. The bottom right hand portion of the screen shows the map's legend, and describes the facility and release in blue, and then shows in black the range, mean, sum and standard deviation of the distribution in black.



To remove any graphing from your map, click on the **Cells** button, then **Change Theme**. In the dialog box under value, select 'None,' then click **OK**. Any graphing on your map will be cleared. For more detail on map functions, please see Chapter 6.

Step 3.3. Further Analyses

The steps outlined above should give you a good idea about one particular facility. However, the model contains much more information that can show you how that facility has been performing over time, or how it ranks in comparison to all facilities in the country, or facilities in similar geographic areas, or in similar industries.

To do a time trend analysis to see if a facility's risk-related score is getting better or worse over time, first do a selection based just on that facility. The easiest way is to simply use the Facility ID, the first column in the **Selected Facilities Browser**, then go back to the **Select elements...** screen, and create a new selection statement with a condition that says 'Facility Identifier. Facility ID is equal to X,' where X is the Facility ID from the **Selected Facilities Browser** (you can copy the Facility ID from the **Selected Facilities Browser** by right-clicking on the ID, then typing Control-C to copy the ID to the Windows clipboard. You can then paste the ID in the selection statement, or in any other Windows

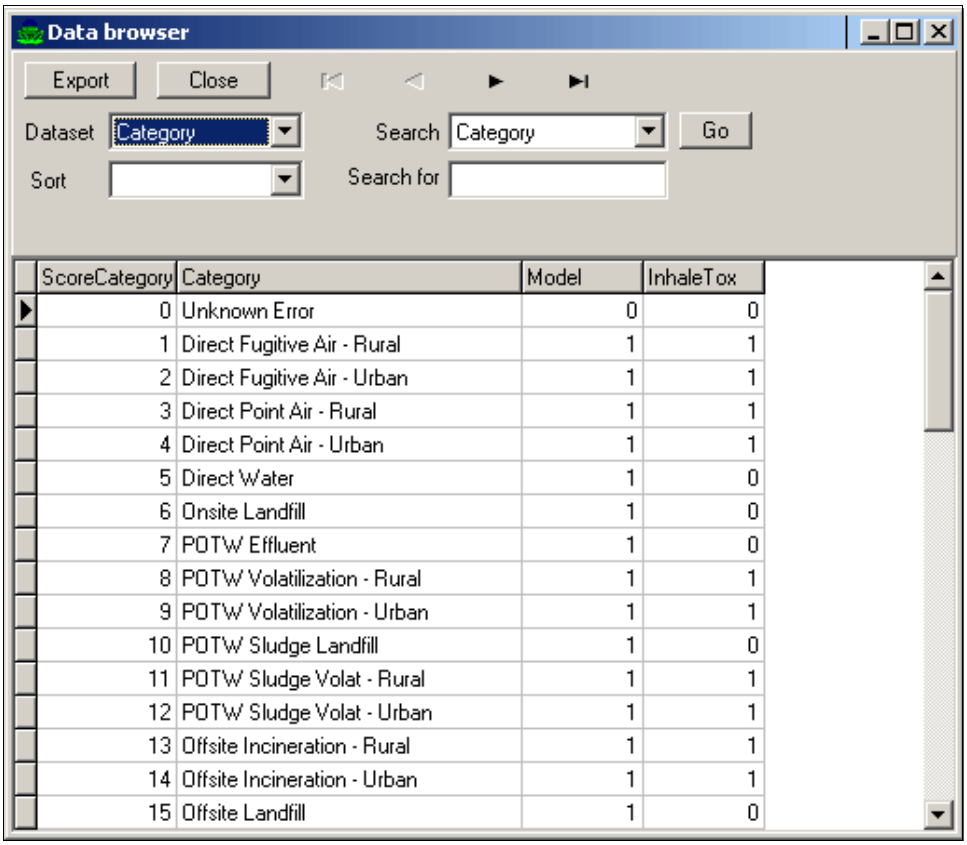
program by typing Control-V). When the model is done with the selection, you can click on the **Summary** button in the second line of the menu panel, and see preformatted graphs that show total score and pounds by year, and total pounds and total score by media by year.

To see how your facility ranks in relation to other facilities, first select a set that includes your facility and all of the facilities to which you want to compare it, for instance, all facilities nationwide in 1998. Your selection statement in the **Select elements...** screen would say 'Submission.Year is equal to 1998.' This selects all releases from all facilities in 1998. When the model is done with your selection, click on the **Custom Tables** button. Follow the directions under that heading in Chapter 8 to make a crosstab table of your results. If you make a table using Facility Name and SIC code as row and column variables, then you can click on the **Sorted Table** button to see a ranking of all the facilities in order of highest score (or pounds, depending on what 'Summary' you have selected) to lowest score. If you want to look at the facilities that are in the same industry as yours, then apply the filter to 'SIC Code 1,' and select just your facility's SIC Code. Then click back to the **Sorted Table**, to see a ranking of all the facilities just in that SIC code.

CHAPTER 4
Viewing Data

Most of the data used by the RSEI model can be viewed by clicking on the **Data** button at the top of the screen.[17] This opens up the **Data browser** screen.

This screen groups the data by dataset. Each dataset is a Paradox table in the 'Database' directory on your hard drive. The dataset name is displayed at the top left of the screen; click on the arrow and scroll through the list to change datasets. In the boxes to the right, you can search fields for specific values. Simply select the desired field in the 'Search' box, and then enter the value in the 'Search for' box, and click 'Go.' Each dataset is ordered by its own unique internal ID number. Some tables can be sorted by more than



ScoreCategory	Category	Model	InhaleTox
0	Unknown Error	0	0
1	Direct Fugitive Air - Rural	1	1
2	Direct Fugitive Air - Urban	1	1
3	Direct Point Air - Rural	1	1
4	Direct Point Air - Urban	1	1
5	Direct Water	1	0
6	Onsite Landfill	1	0
7	POTW Effluent	1	0
8	POTW Volatilization - Rural	1	1
9	POTW Volatilization - Urban	1	1
10	POTW Sludge Landfill	1	0
11	POTW Sludge Volat - Rural	1	1
12	POTW Sludge Volat - Urban	1	1
13	Offsite Incineration - Rural	1	1
14	Offsite Incineration - Urban	1	1
15	Offsite Landfill	1	0

The Data Browser Screen

[17] A small portion of the data used by the model is formatted in such a way that it cannot be viewed by users.

unique internal ID number. Some tables can be sorted by more than one field. Other sorting possibilities will be displayed in the 'Sort' box. Click on any options in the box to change how the table is sorted in the display.

You can move through the records in each dataset using the arrows at the top of the screen, or by using your keyboard arrow keys. To export a table, click on the **Export** button at the top left. Datasets can be exported to a variety of text, database, and spreadsheet files. However, some of the datasets are very large, and may exceed the record limit of some formats, as well as take a substantial amount of time to export. Note that if exporting to Excel, the 'Excel spreadsheet' option is much faster than exporting to 'Excel file.'

The following sections describe each dataset, its variables, how it is used in the model, and its sources.

Category Data

This dataset is a lookup table that lists the codes used to categorize how releases are modeled. The score category codes resemble the media codes that are reported by TRI facilities, but also include information on how the model is able to deal with specific kinds of releases.

Table 4-1. Category Data

Variable	Description
ScoreCategory	Codes corresponding to the medium into which the chemical is released. Examples of the information include: direct air releases from the stack using a "rural" air dispersion model, fugitive air releases, releases to an onsite landfill. [See Table 9-3 in Chapter 9 for descriptions]
Category	Descriptions of release media and other descriptors corresponding with the score category codes. [See Table 9-3 in Chapter 9 for descriptions]
Model	A dummy variable that is '1' when that category can be modeled and '0' when it cannot.
InhaleTox	A dummy variable that is '1' when the model requires a inhalation toxicity score to model this kind of release and '0' when it does not.

Census Data

RSEI Census data is contained in two tables, Census 00 (data from the 2000 Census) and Census 90 (data from the 1990 Census). These two tables contain the Census data that has been transposed onto the RSEI model grid. See Chapter 1 for a description of how Census data is used in the model. Each Census table is over 600 Mbytes in size. They cannot be exported. Census data has been provided by Geolytics, Inc., and was last updated in the fall of 2001.

Table 4-2. Census 90 Data

Variable	Description
X	Assigned grid cell value based on latitude
Y	Assigned grid cell value based on longitude
Male0to9 through Female65andUp	The number of people in the grid cell in each Census subpopulation group in the year 1990.

Table 4-3. Census 00 Data

Variable	Description
X	Assigned gridcell value based on latitude
Y	Assigned grid cell value based on longitude
Male0to9 through Female65andUp	The number of people in the grid cell in each Census subpopulation group in the year 2000.

Chemical Data

This dataset lists all of the chemical-specific information used by the model. The data can be grouped into four categories:

Chemical identifiers include CAS numbers and chemical names.

Chemical toxicity information includes all of the information used to construct toxicity weights for each chemical. Of the 607 chemicals on the 1999 TRI Reporting list, 425 chemicals have toxicity information included in the model. The sources of these values, in the order of most to least preferred, are EPA's Integrated Risk Information System (IRIS); EPA Office of Pesticide Programs' Toxicity Tracking Reports (OPP); Agency for Toxic Substances and Disease Registry final, published chronic MRLs (ATSDR); California Environmental Protection Agency's Office of Environmental Health Hazard Assessment final, published toxicity values (Cal/EPA); EPA's Health Effects Assessment Summary Tables (HEAST); and Final Derived/Interim Derived Toxicity Weights (Derived) estimated by EPA's Office of Pollution Prevention and Toxics. In cases where none of the above sources had sufficient data, other secondary sources were consulted and reviewed by EPA experts (DERIVED). Chemical toxicity data is reviewed and updated on a continuing basis. See Technical Appendix A for toxicity values

Chemical Properties information includes all of the physicochemical properties used to model the fate and transport of the chemicals in the environment. Experimental and estimated data is used, most of it obtained from sources published by Syracuse Research Corporation (SRC). This data is also reviewed and updated continuously. See Technical Appendix B for details on each parameter.

Chemical Flags are markers that can be used to select chemicals that are designated in specific ways, usually by EPA. Examples include Hazardous Air Pollutants (HAPs), or chemicals regulated under the Safe Drinking Water Act (SDWA). The chemical flags were last comprehensively checked against each relevant list in December, 1999 (see Technical Appendix F for details). Two new flag fields, High Production Volume (HPV) chemicals and Persistent Bioaccumulative and Toxic (PBT) chemicals were added in July of 2000.

Table 4-4. Chemical Data

Variable	Description
CASNumber	Chemical Abstracts Service Registry Number, which identifies a unique chemical. For chemical categories, CAS Numbers begin with "N", followed by three digits.
CASStandard	The Chemical Abstracts Service Registry Number identifies a unique chemical. The standard format contains three sets of numbers divided by hyphens (00-00-0).
ChemicalNumber	Unique internal identifier.
Category	This identifier is not yet active.
SortCAS	Chemical Abstracts Service Registry Number, which identifies a unique chemical, formatted for sorting (no hyphens). For chemical categories, CAS Numbers begin with "N", followed by three digits.
SortName	Common name of chemical, with initial modifiers moved to end of name. Used for internal sorting purposes.
FullChemicalName	Full scientific name(s) of the chemical.
Chemical	Common name(s) of the chemical.
Added	The year the chemical was added to the Toxics Release Inventory
Toxicity Source	All sources used for toxicity data, and date of addition to database.
RfCInhale	The inhalation reference concentration (RfC) is defined as "an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious noncancer health effects during a lifetime" (U.S. EPA, 1994). Units are mg/m^3.
RfCUF	The uncertainty factor (UF) is applied to the no-observed-adverse-effect level (NOAEL) upon which the RfC is based, thereby reducing the dose. The UF accounts for uncertainties in extrapolation from experimental data to an estimate appropriate to humans.
RfCMF	The modifying factor (MF) is a value applied to the NOAEL when scientific uncertainties in the study chosen for estimating the RfC are not explicitly addressed by the standard UFs.
RfCConf	Confidence levels are assigned to the study used to derive the RfC, the overall database, and to the RfC itself.
RfCSource	Source used for the RfC value.

Table 4-4. Chemical Data

Variable	Description
RfCListingDate	Date that RfC was listed, if available.
RfDOral	The oral reference dose (RfD) is "an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure [*by ingestion*] to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime" (Barnes, 1988). (mg/kg-day)
RfDUF	The uncertainty factor (UF) is applied to the no-observed-adverse-effect level (NOAEL) upon which the RfD is based, thereby reducing the dose. The UF accounts for uncertainties in extrapolation from experimental data to an estimate appropriate to humans.
RfDMF	The modifying factor (MF) is a value applied to the NOAEL when scientific uncertainties in the study chosen for estimating the RfD are not explicitly addressed by the standard UFs.
RfDConf	Confidence levels are assigned to the study used to derive the RfD, the overall database, and to the RfD itself.
RfDListingDate	Date that RfD was listed, if available.
RfDSource	Source used for the RfD value.
UnitRiskInhale	The unit inhalation risk is the excess lifetime risk due to a "continuous constant lifetime exposure of one unit of carcinogen concentration"(51 FR 33998). ($1/mg/m^3$)
QSTAROral	The oral cancer slope factor (q_1^*): a measure of the incremental lifetime risk of cancer by oral intake of a chemical, expressed as risk per mg/kg-day. (1/mg/kg-day)
WOE	Weight of evidence (WOE) categories indicate how likely a chemical is to be a human carcinogen, based on considerations of the quality and adequacy of data and the type of responses induced by the suspected carcinogen. EPA WOE classifications include the following categories and associated definitions (51 FR 33996): A Carcinogenic to humans B Probable carcinogen based on: •B1 Limited human evidence •B2 Sufficient evidence in animals and inadequate or no evidence in humans C Possible carcinogen D Not classifiable E Evidence of non-carcinogenicity

Table 4-4. Chemical Data

Variable	Description
UnitRiskListingDate	Date that Unit Risk was listed, if available.
UnitRiskSource	Source used for the Unit Risk value.
QstarListingDate	Date that QStar was listed, if available.
QStarSource	Source used for the QStar value.
WOEListingDate	Date that WOE was listed, if available.
WOESource	Source used for the WOE value.
ITW	Inhalation Toxicity Weight: the TRI Indicator toxicity weight for a chemical for the inhalation pathway.
OTW	Oral Toxicity Weight: the TRI Indicator toxicity weight for a chemical for the oral pathway.
AirDecay	The rate at which a chemical degrades in air, due primarily to photooxidation by radicals (hr^{-1}).
K_{oc}	The organic carbon-water partition coefficient, used in estimates of chemical sorption to soil (mL/g).
H_2ODecay	The rate at which a chemical degrades in water, due to abiotic hydrolysis, biodegradation, or photolysis (hr^{-1}).
LOGK_{ow}	The logarithm of the octanol-water partition coefficient. K_{ow} is the ratio of a chemical's concentration in the octanol phase to its concentration in the aqueous phase at equilibrium in a two-phase octanol/water system.
K_d	The soil-water partition, or distribution, coefficient. For organics, the value is often estimated as the product of K_{oc} and f_{oc} (the fraction of organic carbon in the soil) (L/kg).
WaterSolubility	The amount of chemical that dissolves in water at a particular temperature (mg/L).
POTWPartitionRemoval	Percent of chemical removed from the wastewater by the POTW (Publicly Owned Treatment Works).
POTW PartitionSludge	Percent of total POTW removal efficiency attributable to sorption of the chemical to sewage sludge.
POTW PartitionVolat	Percent of total POTW removal efficiency attributable to volatilization of the chemical.

Table 4-4. Chemical Data

Variable	Description
POTW PartitionBiod	Percent of total POTW removal efficiency attributable to biodegradation of the chemical.
IncineratorDRE	Destruction/removal efficiencies, expressed as the percent of chemical fed to the incinerator that is not released to the air.
BCF	Bioconcentration factor: the ratio of a chemical's concentration in fish to its concentration in water at equilibrium (L/kg).
Henrys	Henry's law constant: the ratio of a chemical's concentration in the air to its concentration in the water at equilibrium ($atm \cdot m^3/mol$).
MCL	Maximum Contaminant Level, which is EPA's national primary drinking water standard for the chemical. This is the current value; historical data is contained in the table, 'MCL.'
Molecular Weight	The mass in grams of one mole of molecules of a chemical compound.
T33/50Flag	This flag is a marker which indicates that the chemical is included in EPA's 33/50 program, a program in which facilities voluntarily reduce their chemical releases by 33 percent and 50 percent by certain dates.
HAPFlag	This flag marks the chemicals that are hazardous air pollutants, as defined by the Clean Air Act.
CAAFlag	This flag marks the chemicals that are Clean Air Act pollutants.
PriorityPollutantFlag	This flag marks the chemicals that are priority pollutants, as defined by the Clean Water Act.
SDWAFlag	This flag marks the chemicals that have national primary or secondary drinking water standards under the Safe Drinking Water Act.
CERCLAFlag	This flag marks the chemicals that are regulated under Superfund (CERCLA—the Comprehensive Environmental Response, Compensation, and Liability Act).

Table 4-4. Chemical Data

Variable	Description
OSHACarcinogens	This flag indicates whether the chemical is a known or suspect human carcinogen based on OSHA criteria (U.S. EPA, 1998). Known human carcinogens are defined as those that have been shown to cause cancer in humans. Suspect human carcinogens have been shown to cause cancer in animals. The list of chemicals flagged as OSHA carcinogens is based on the list of carcinogens provided in the 1997 TRI Public Data Release, which was compiled from the following sources: the National Toxicology Program's *Annual Report on Carcinogens*, the International Agency for Research on Cancer *Monographs*, and 29 CFR 1910[18].
ExpansionFlag	This flag marks the chemicals that were added to the Section 313 toxic chemical list for reporting in 1995 and later years.
ToxicityCategory	This indicates whether the oral and inhalation toxicity weights are based on cancer health effects, non-cancer health effects, or both.
User Tags 1 through 5	Using these tags, you can select a set of chemicals based on your own selection criteria.
ToxicityClassOral	This indicates whether the toxicity weight for the oral pathway is based on cancer or noncancer health effects.
ToxicityClassInhale	This indicates whether the toxicity weight for the inhalation pathway is based on cancer or noncancer health effects.
ToxicitySource	Source of toxicity information
CoreChemicalFlag	This flag marks the chemicals that are common to all reporting years of TRI *and* that have had no modifications of reporting requirements.
Metal	This flag indicates whether the chemicals are metals and also whether they are core chemicals. (Core chemicals are those that are common to all reporting years of TRI and which have had no modifications of reporting requirements.)

[18] Even if a chemical is flagged as an OSHA carcinogen, its toxicity weight for a given exposure pathway may not be based on its carcinogenic effects. For example, a chemical that causes both carcinogenic and noncarcinogenic effects when inhaled may have a higher inhalation toxicity weight associated with noncarcinogenic effects than with its carcinogenic effects. If you wish to view all chemicals that have inhalation toxicity weights based on cancer health effects, see the *Toxicity Class - Inhale* field. To obtain a list of chemicals that have toxicity weights based only on cancer health effects, see the *Toxicity Category* field.

Table 4-4. Chemical Data

Variable	Description
HPVFlag	Indicates whether the chemical is designated as a High Production Chemical.
PBTFlag	Indicates whether EPA has designated this chemical as a priority chemical under the Persistent Bioaccumulative and Toxic (PBT) Chemical Program.
HasTox	Indicates that the chemical has a toxicity weight (either oral or inhalation) in the dataset.
MaxTW	Shows the greater of the two possible toxicity weights (oral or inhalation).

County Data

This dataset is based on U.S. Census data, and was last updated in August, 2000. Total county population is taken from directly from U.S. Census bureau estimates (this data is not directly used in the model). Total fishing population is obtained from state counts of county-specific records on hunting and fishing licenses, where available. The fishing population is used to model the ingestion of contaminated fish in one of the two surface water pathways. In the model, the total fishing population is adjusted for family size (to take into account the family of the licensed fisher who also eat the caught fish), and 95 percent of the total is considered to be recreational fishers, and 5 percent are considered to be subsistence fishers; the variable in this dataset is the unadjusted number of licensed fishers only. The fishing population data was collected and added to the model for the first time in August, 2000. See Chapter V of the Methodology document for details.

Table 4-5. County Data

Variable	Description
FIPS	FIPS (Federal Information Processing Standard) code which identifies the county associated with the facility
Name	State, County
Latitude	Latitude in decimal degrees of the county centroid.
Longitude	Longitude in decimal degrees of the county centroid.
AreaSqKm	County area in square kilometers.
WaterAreaSqKm	Area of the county that is covered with water in square kilometers.
Population1998 through Population1970	Total midyear population of each county for year indicated.
TotalFishingPopulation	Number of people in each county with fishing licenses.

CountyExp Data

This dataset is used in conjunction with the total population data in the 'County' dataset to construct detailed yearly population estimates. This data was last updated in August 2000. All of the data is from the U.S. Census Bureau. This data is not used directly by the RSEI model.

Table 4-6. CountyExp Data

Variable	Description
FIPS	FIPS (Federal Information Processing Standard) code which identifies the county.
Year	Year (1988 through 1998) of the record's data.
Male0to9 through Female65Up	Fields showing number of people in each indicated demographic group for the indicated year for the indicated county. These fields are mutually exclusive (they sum to the total number of people in the county).

Elements Data

This table lists unique Indicator elements and their attributes. All of this data is internal to the RSEI model, and is used solely for modeling purposes. It is shown for comprehensiveness only, and is unlikely to be useful to users. This table is over 200 Mbytes in size. It cannot be exported.

Table 4-7. Elements Data

Variable	Description
ElementNumber	Unique internal identifier.
ReleaseNumber	Unique internal identifier.
PoundsPT	Total pounds after any treatment by POTWs or other offsite facilities.
ScoreCategory	Codes corresponding to the medium into which the chemical is released. Examples of the information include: direct air releases from the stack using a "rural" air dispersion model, fugitive air releases, releases to an onsite landfill. [See Table 9-3 in Chapter 9 for descriptions]
Score	Total indicator element score.
Population	Total population exposed.
ScoreA	Indicator element score for children 0 through 9 years of age (inclusive).
PopA	Number of children 0 through 9 years of age (inclusive) exposed.
ScoreB	Indicator element score for children between 10 and 17 (inclusive).
PopB	Number of children between 10 and 17 (inclusive) exposed.
ScoreC	Indicator element score for adults 18 through 44 (inclusive).
PopC	Number of adults 18 through 44 (inclusive) exposed.
ScoreD	Indicator element score for adults 45 through 64 (inclusive).
PopD	Number of adults 45 through 64 (inclusive) exposed.
ScoreE	Indicator element score for adults 65 years old and greater.
PopE	Number of adults 65 years old and greater exposed.

Facility Data

This dataset is a combination of TRI Reported data, and derived data used to model emissions from the facilities. Each case is noted after the variable description in the table below.

Derived stack parameter data was primarily collected from two national EPA databases (AFS and NET). This data is collected and reprocessed annually. Facilities are matched where possible- i.e., facility-specific parameters are used. For facilities that cannot be matched, median values at the 3-digit SIC code level are used. If that is not possible, in cases where the TRI facility did not submit a valid SIC code, or there are no facilities for that SIC code in the two EPA databases, median values are used. The AFS/NET data is supplemented by a one-time data pull conducted in 1998 from three state databases containing facility-specific data. The states involved are Wisconsin, New York and California. Only data for facilities that were not matched through AFS/NET were used from these databases. Starting in RY 1998, electric utilities are required to report to TRI. Because their stack parameters are generally quite different from other facilities, facility-specific data collected by the Electric Power Research Institute (EPRI) were used to represent these facilities. In cases where facilities falling in the electric utility SIC codes could not be matched, the overall median of all coal and gas electric utilities from EPRI's dataset was used. For the complete method used in this process, see Technical Appendix E.

The derived facility location data is the result of a general quality-assurance process performed on the locations of the TRI reporting facilities and the offsite facilities. The TRI reporting facilities, as contained in this dataset, have been assigned new latitude and longitude coordinates in cases where the submitted data did not pass basic QA checks, as performed in 1996 or in 2000. The new coordinates were generated by a commercial firm, Thomas Computing Services, based on the facility's reported street address. For a complete account of this process, see Technical Appendix D.

Table 4-8. Facility Data

Variable	Description
FacilityID	Unique TRI identifier for facility. (As Reported)
FacilityNumber	Unique internal identifier. (Derived)
DataSource	This variable is not yet active.
Latitude	Final latitude of the facility in decimal degrees. (Derived)
Longitude	Final longitude of the facility in decimal degrees. (Derived)
X	Assigned grid value based on latitude (Derived)
Y	Assigned grid value based on longitude (Derived)
StackHeight	Height of facility stack that is emitting the pollutant (m) (Derived)
StackVelocity	Rate at which the pollutant exits the stack (m/s) (Derived)
StackDiameter	Diameter of facility stack that is emitting the pollutant (m) (Derived)
StackHeightSource	Source of information on stack height (Derived)
StackDiameterSource	Source of information on stack diameter (Derived)
StackVelocitySource	Source of information on stack velocity (Derived)
RadialDistance	Distance from approximate center point of grid. (Derived)
Name	TRI facility name (As Reported)
Street	Street address of facility. (As Reported)
City	City where the TRI facility is located (As Reported)
County	County where the TRI facility is located (As Reported)
State	State in which the facility is located (As Reported)
FIPS	FIPS (Federal Information Processing Standard) code which identifies the county associated with the facility (As Reported)
STFIPS	FIPS (Federal Information Processing Standard) code which identifies the state associated with the facility (As Reported)
ZIPCode	Facility ZIP code (As Reported)
DUNS	The 9-digit number assigned by Dun & Bradstreet for the facility or establishment within the facility (As Reported)

Table 4-8. Facility Data

Variable	Description
ParentName	Name of the corporation or other business entity located in the U.S. that directly owns at least 50 percent of the voting stock of the facility (As Reported)
ParentDUNS	The 9-digit number assigned by Dun & Bradstreet for the US parent company (As Reported)
Region	EPA region where facility is located. There are 10 EPA regions. Any information which cannot be matched to an actual EPA region (e.g., an unrecognized ZIP code) is assigned to a dummy region (called UK) (As Reported)
FederalFacilityFlag	Code describing federal status for purposes of Executive Order 12856. C =commercial; F = federal; G= government contractor). (As Reported)
PublicContactName	Name submitted by TRI facility as public contact. (As Reported)
PublicContactPhone	Phone number submitted by TRI facility for public contact. (As Reported)
SICCode1	First facility 4-digit SIC code reported on Form R (As Reported)
SICCode2	Second 4-digit SIC code reported on Form R (As Reported)
SICCode3	Third 4-digit SIC code reported on Form R (As Reported)
SICCode4	Fourth 4-digit SIC code reported on Form R (As Reported)
SICCode5	Fifth 4-digit SIC code reported on Form R (As Reported)
SICCode6	Sixth 4-digit SIC code reported on Form R (As Reported)
SICCode2Digit	First 2 digits of first SIC code (Derived)
SICCode3Digit	First 3 digits of first SIC code (Derived)
EPASICCode2Digit	EPA standardized 2-digit SIC code. This code uses all SIC codes reported by a facility to arrive at a single 2-digit code for the facility, if applicable. If reported 4-digit codes differ in the first two digits, the “multiple code” is used. (Derived)
NPDESPermitNumber	Permit number issued by US EPA for facilities discharging to water. (As Reported)

Table 4-8. Facility Data

Variable	Description
RCRANumber	Number assigned by EPA to facilities handling hazardous waster under the Resource Conservation and Recovery Act. (As Reported)
NearStream	USGS Reach Identifier. (Concatenation of Catalog, Unit, Segment) (Derived)
DistancetoStream	The distance between a facility discharging to water and the reach of the receiving water body (km). (Derived)
WBANID	The ID assigned to the Weather Bureau/Army/Navy Weather Station nearest to the facility. (Derived)
DistancetoWBAN	The distance between a facility and the nearest weather station (km). (Derived)
SubmitLat	Latitude in decimal degrees exactly as submitted by the TRI facility. (As Reported)
SubmitLong	Longitude in decimal degrees exactly as submitted by the TRI facility. (As Reported)
PreferredLat	Latitude in decimal degrees after correction by TRI. (Derived)
PreferredLong	Longitude in decimal degrees after correction by TRI. (Derived)
LatLongSource	Source of final lat/long found in 'Latitude' and 'Longitude' fields. (Derived)
OnTribalLand	Whether facility is located within the boundaries of a Tribal Land (True/False). (Derived)
TribalLandName	Name of Tribal Land within which facility is located. (Derived)
FINAL_AC	Accuracy of the final coordinates (in m).

Table 4-8. Facility Data

Variable	Description
FINAL_CM	Collection method code for the final coordinates: A1- address matching, house number A2- address matching, block face G3- gps code measurements (pseudo range) differential (dgps) G4- gps code measurements (pseudo range) precise positioning service I1- interpolation-map I2- interpolation-photo OT- other Z1- ZIP code-centroid
FINAL_DC	Description category of the final coordinates: PG- plant entrance (general) FC- facility centroid CE- center of facility OT- other UN- unknown
FINAL_HD	Horizontal datum of the final coordinates 1- NAD27 2- NAD83 O- OTHER U- UNKNOWN
FINAL_SMS	Source map scale of the final coordinates: E- 1:24,000 J- 1:100,000
FINAL_QA	Results of four quality assurance tests performed by EPA in 1998.
FINAL_MV	Results of verification performed by EPA.

MCL (Maximum Contaminant Level)

This dataset contains yearly information on the Maximum Contaminant Levels (MCLs) that EPA sets for chemicals to limit the level of contaminants in drinking water from public water systems. As the MCLs are legally enforceable, the RSEI model assumes that drinking water from public systems in compliance with these standards. The first MCLs were instituted in

1976; changes to existing MCLs and new MCLs have been instituted since then, including the addition of a large number of new MCLs in 1991.

This table lists the value for each MCL for each year of TRI data. For several chemicals for which MCLS were first instituted in 1976 and then revised in 1991, the original MCL values were not readily available, so the revised values were also used for the years before the revision. These chemicals are barium, cadmium, chromium, lead, lindane, mercury, methoxychlor, nitrate, selenium, and toxaphene.

Table 4-9. MCL Data

Variable	Description
CASNumber	Chemical Abstracts Service Registry Number, which identifies a unique chemical. For chemical categories, CAS Numbers begin with "N", followed by three digits.
CASStandard	The Chemical Abstracts Service Registry Number identifies a unique chemical. The standard format contains three sets of numbers divided by hyphens (00-00-0).
ChemicalNumber	Unique internal identifier.
Chemical	Common name(s) of the chemical.
MCL1988...MCL1999	MCL for each year an MCL was in effect.

Media Data

This dataset lists the release media codes and their description as reported in TRI Reporting Form R. For reported media codes that begin with 'M', the RSEI model has substituted a 7. For instance, code M54 would be the same as 754 in the table below.

Table 4-10. Media Data

Variable	Description
Media	Code associated with the media and/or method of release, as reported by facility in TRI Reporting Form R. See Table 9-2 in Chapter 9 for codes.
MediaText	Descriptions of receiving media associated with Media Codes
Sum	This variable is not yet implemented.

Offsite Data

This dataset is derived from TRI reported data. Offsite facilities are any facilities to which a TRI reporting facility transfers a reportable release. The names and addresses of these offsite facilities are reported by the TRI facilities transferring their releases. Because multiple facilities may transfer releases to the same offsite facility, the same offsite facility may be reported multiple times in slightly different forms. To approximate a set of unique offsite facilities, a sophisticated program was developed to match slightly different reported entries that were really the same offsite facility. Because latitude and longitude are not reported but are necessary to model releases, the offsite facilities were also geocoded (assigned latitude and longitude coordinates based on street address) by a commercial firm using standard geocoding software based on U.S. Census Tiger files. This dataset contains the results of both the matching exercise and the geocoding exercise. Both exercises are updated annually. For a complete account of the process, see Technical Appendix D.

Table 4-11. Offsite Data

Variable	Description
OffsiteID	Unique internal identifier for each offsite facility.
FacilityNumber	Unique internal identifier for each offsite facility.
DataSource	This variable is not yet active.
Name	Best submitted name for offsite facility.
Street	Best submitted street address for offsite facility.

Table 4-11. Offsite Data

Variable	Description
City	Best submitted city for offsite facility.
County	Best submitted county for offsite facility.
ZIPCode	Best submitted ZIP code for offsite facility.
ZIP9	This variable is not yet implemented.
FIPS	This variable is not yet active.
Latitude	Geocoded latitude in decimal degrees for offsite facility.
Longitude	Geocoded longitude in decimal degrees for offsite facility.
X	Assigned grid value based on latitude.
Y	Assigned grid value based on longitude.
Radial Distance	Distance from approximate center point of grid.
StackHeight	Default stack height used for offsite facilities.
StackVelocity	Default stack velocity used for offsite facilities.
StackDiameter	Default stack diameter used for offsite facilities.
Class	This variable is not implemented.
WBANID	The ID assigned to the Weather Bureau/Army/Navy Weather Station nearest to the facility.
NPDESPermit	Permit number issued by US EPA for facilities discharging to water.
RCRANumber	Number assigned by EPA to facilities handling hazardous waster under the Resource Conservation and Recovery Act.
DistanceToWBAN	The distance between an offsite facility and the nearest weather station (km).
NearStream	USGS identifier defining stream reach of the receiving water body.
Distance to Stream	The distance between an offsite facility discharging to water and the reach of the receiving water body (km).
StreamSource	Data source linking stream reach to facility.
GDTType	Type of geocoded match.

Table 4-11. Offsite Data

Variable	Description
GDTRank	Rank from 1 to 9 describing quality of geocoded match (1 is best).
freq	Number of TRI transfers sent to this offsite facility.

Reach Data

This dataset contains information on each stream reach contained in the model. The stream reaches used are linear sections of streams, lakes, reservoirs, and estuaries that are linked to form a skeletal structure representing the branching patterns of surface water drainage systems. Only transport reaches (i.e., those that have an upstream or downstream connection) are included in the model. There are no marine areas in the RSEI model. The stream reach data are based on U.S. EPA's Reach File Version 1.0 (RF1) for the conterminous United States. RF1 is a database that identifies and subdivides streams and shorelines of the United States to provide a hydrological framework for organizing water resource data. RF1 was prepared by the U.S. EPA in 1982 in support of the Better Assessment Science Integrating Point and Nonpoint Sources (BASINS) system. EPA is currently engaged in creating an updated Reach File (RF3), which will be incorporated into the model when finalized.

Table 4-12. Reach Data

Variable	Description
CatalogUnitSegment	This is the unique 11 digit alphanumeric United States Geological Survey (USGS) identifier for each reach.
DownstreamReach	This is the catalog unit/segment identifier for the immediate downstream reach of a given reach.
AverageFlowMLD	Average annual flow at the base of the immediate reach in millions of liters per day.
SEVQ10FlowMLD	The lowest flow over a seven day period in the last ten years at the base of the immediate reach in millions of liters per day.
ONEQ10FlowMLD	The lowest flow over a one day period in the last ten years at the base of the immediate reach in millions of liters per day.

Table 4-12. Reach Data

Variable	Description
HarmonicMeanFlowMLD	The harmonic mean of annual flow at the base of the immediate reach in millions of liters per day.
MeanVelocityMS	The mean flow velocity in meters per second.
LowVelocityMS	The low flow velocity in meters per second.
SegmentLengthKM	The length of the immediate reach in kilometers.
Dummy	This variable is not yet active.
UpstreamLat	The latitude of the upstream end of the immediate reach in decimal degrees.
UpstreamLong	The longitude of the upstream end of the immediate reach in decimal degrees.
Q3Lat	The third quartile latitude upstream from the base of the reach in decimal degrees.
Q3Long	The third quartile longitude upstream from the base of the reach in decimal degrees.
MidLat	The midpoint latitude along the reach path in decimal degrees.
MidLong	The midpoint longitude along the reach path in decimal degrees.
Q1Lat	The first quartile latitude upstream from the base of the reach in decimal degrees.
Q1Long	The first quartile longitude upstream from the base of the reach in decimal degrees.
DownstreamLat	The latitude of the downstream end of the immediate reach in decimal degrees.
DownstreamLong	The longitude of the downstream end of the immediate reach in decimal degrees.
MaxLat	The maximum latitude of the immediate reach in decimal degrees.
MaxLong	The maximum longitude of the immediate reach in decimal degrees.
MinLat	The minimum latitude of the immediate reach in decimal degrees.
MinLong	The minimum longitude of the immediate reach in decimal degrees.

ReachPops Data

This dataset contains information derived from the placement of the population (from U.S. Census data) on the model grid in relation to stream reaches (from U.S. EPA's RF1).

Table 4-13. Reach Pops Data

Variable	Description
CatalogUnitSegment	This is the unique 11 digit alphanumeric United States Geological Survey (USGS) identifier for each reach.
PrimaryFIPS	County in which the reach is located.
ExposedPop	Number of people eating from reach.
TotalPop	All people within 50 km of reach.
Cells	Number of populated cells within 50 km of reach.
Male0to9 through Female65Up	Fields showing number of people in each indicated demographic group for the indicated year for the indicated county. These fields are mutually exclusive (they sum to the total number of people in the county).

Release Data

This dataset contains the total pounds released as reported in TRI, and the total score for each release, as well as the release media and the offsite facility that received the release, if any. The Indicator total score is added up to form subelements when selections are run.

Table 4-14. Release Data

Variable	Description
ReleaseNumber	Unique internal identifier.
SubmissionNumber	Unique internal identifier.
Media	Code associated with the media and/or method of release, as reported by facility in TRI Reporting Form R. See Table 9-2 in Chapter 9 for explanation of codes.
PoundsReleased	Total pounds released, without accounting for treatment.
OffsiteNumber	Unique identifier for offsite facility receiving this release, if any.
TotalScore	Total Indicator score for release.
LastUpdated	Internal QA field.

SIC Table Data

Standard Industrial Classification (SIC) codes are used to classify businesses into industry groups producing the same or similar goods. They are maintained by the U.S. Occupational Health and Safety Administration (OSHA) and can be found online at http://www.osha.gov/oshstats/sicser.html. This dataset is a direct reproduction of that portion of the OSHA SIC code table that is reportable to TRI.

Table 4-15. SIC Data

Variable	Description
SICCode	Four-digit SIC code.
LongName	Text description of code.

Submission Data

This dataset reproduces TRI reported data. However, SubmissionNumber, FacilityNumber, and ChemicalNumber are unique identifiers internal to the model.

Table 4-16. Submission Data

Variable	Description
DCN	Unique identifier assigned by TRI to each facility submission.
SubmissionNumber	Internal identifier assigned to each submission.
FacilityNumber	Internal identifier unique to each facility.
ChemicalNumber	Internal identifier unique to each chemical.
Year	Year of facility release.
Use	Code describing how chemical is used in reporting facility, as reported on TRI Reporting Form R. See Table 9-4 in Chapter 9 for an explanation of the codes.
LongOrShort	Code describing whether the submission came from a short or long form.
MaxOnsite	Code describing the maximum amount of the chemical onsite at reporting facility, as reported in TRI Reporting Form R. See Table 9-4 in Chapter 9 for an explanation of the codes.
TotalPounds	Total pounds released.

Weather Data

Weather data used in the model include wind speed, wind direction, and atmospheric stability. The source of these data are STability ARray (STAR) data, which are available from weather stations throughout the U.S. The model uses STAR data averaged over the period 1988-1996 from the weather station closest to the facility being modeled. This dataset contains the averaged data for each weather station, but the format of the data prevents it from being viewed in the data browser. This data was last updated in 2000.

Table 4-17. Weather Data

Variable	Description
WBAN	Unique internal identifier.
Year	This variable is not yet active.
WBANID	The ID assigned to the Weather Bureau/Army/Navy Weather Station.
Radial Distance	Distance from approximate center point of grid, used in searching for the weather station nearest to facility.
Name	This variable is not yet active.
Latitude	Latitude of the weather station in decimal degrees.
Longitude	Longitude of the weather station in decimal degrees.
Temperature	This variable cannot be viewed in the data browser.
F	This variable cannot be viewed in the data browser.
PointUrban	This variable cannot be viewed in the data browser.
AreaUrban	This variable cannot be viewed in the data browser.
PointRural	This variable cannot be viewed in the data browser.
AreaRural	This variable cannot be viewed in the data browser.

WSDB (Water System) Data

This dataset contains public water systems, the locations of their drinking water intakes (although this information is not viewable by the public), and the population served by each intake. This data is taken from EPA's Safe Drinking Water Information System (SDWIS). However, this dataset only lists the intake location and the number of people served by each intake, not the location of the served population itself. In the absence of data on exactly which people are drinking from the intake in question, the model assumes the closest people to the drinking water intake are using it. This dataset was last updated in winter 2002

This dataset also contains information on the reach that supplies the drinking water intake. In the absence of this information, it is assumed that the intake is located on the reach nearest the reported coordinates for the drinking water intake. The closest reach was determined using reach shape files and plotting the intakes using their coordinates. There were 564 drinking water intakes in the continental US in the SDWIS data which are missing latitude and longitude but do report a county. The population served by these intakes was evenly distributed among the stream reaches in their reported counties. For those reaches that cross county boundary lines, population was only assigned for the length of the reach within the county in question.

Table 4-18. WSDB (Water System) Data

Variable	Description
IntakeID	Unique internal identifier.
PWSID	Public Water System ID
PWSName	Name of Public Water System
State	State in which water system is located.
CountyServed	Primary county served by the public water system.
CityServed	Primary city served by the public water system.
PopulationServedEq	Number of people served by the public water system. For drinking water intakes without coordinates whose population was distributed among the reaches in the county, this number represents the population per reach-intake combination if people are distributed equally among reaches.
PopulationServedL	Number of people served by the public water system. For drinking water intakes without coordinates whose population was distributed among the reaches in the county, this number represents the population per reach-intake combination if people are distributed proportionately among reaches based on reach length.
CatalogUnitSegment	Unique 11 digit alphanumeric United States Geological Survey (USGS) identifier for each reach.
CountyReachFlag	This flag indicates whether the intake was located using coordinates from SDWIS (False), or whether its population was distributed among all reaches in the county where the intake is located (True).
Latitude	Latitude of the water system in decimal degrees (zeroed out).
Longitude	Longitude of the water system in decimal degrees (zeroed out).
DistanceM	Distance from the drinking water intake to the modeled intake reach (m).
TotalReachLengthKm	For drinking water intakes without coordinates whose population was distributed among the reaches in the county, this is the total length of each reach assigned population (km).
ReachLengthInCountyKm	For drinking water intakes without coordinates whose population was distributed among the reaches in the county, this is the length of each reach assigned population that is in the same county as the intake (some reaches cross county borders) (km).

ZIP Code Data

The percent of persons who drink well water is available for each county from the National Well Water Association's data files. These percentages are applied to the population in individual grid cells to estimate the well water drinkers in a given grid cell. This is used in modeling ground water contamination. This dataset was last updated in 1996.

Table 4-19. ZIP Code Data

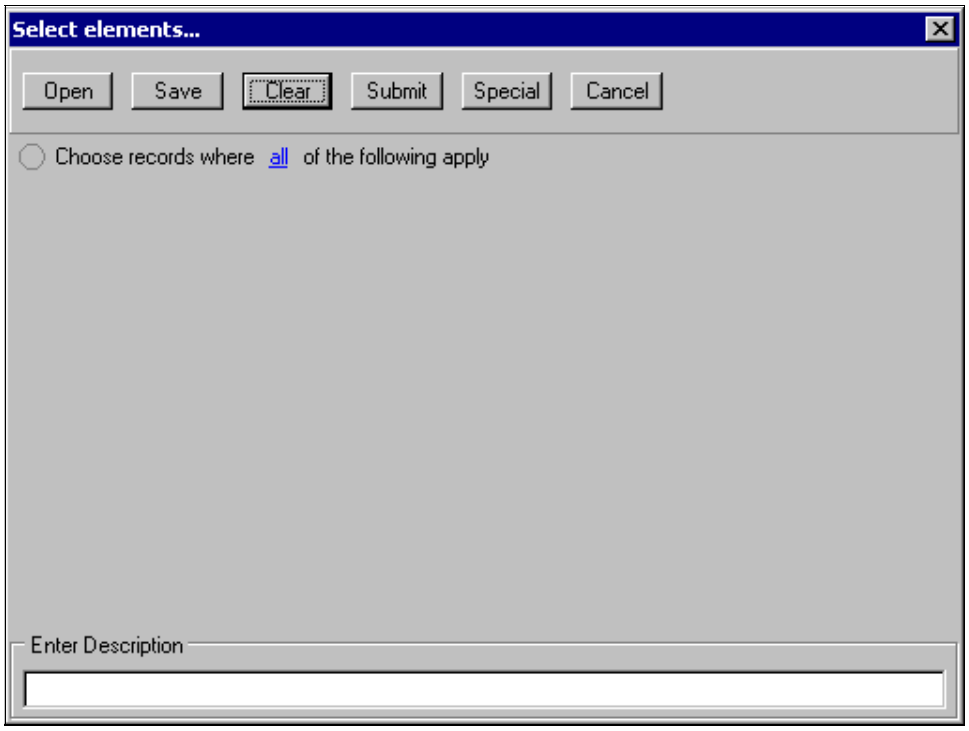
Variable	Description
ZIPCode	Five-digit ZIP code
Latitude	Latitude of the ZIP code centroid in decimal degrees.
Longitude	Longitude of the ZIP code centroid in decimal degrees.
WellWaterPct	Percent of the population in the ZIP code that get their drinking water from a well.
RadialDistance	Distance from approximate center point of grid.

CHAPTER 5
Selecting Elements

Selecting Elements (Select button)

The **Select** button, found at the top of the menu panel, allows you to build selection statements that pull out specific subsets of data in the model. These subsets can be based on the geographic locations of facilities, the year of the chemical releases, the kinds of chemicals released, or any other single variable or combination of variables included in the model. This selection will then be used as the basic dataset for all of the other model functions, like crosstab and sorted tables, graphs, and maps.

The following sections explain how the **Select** button can be used to develop new selections, and save and reopen them. Pressing the **Select** button brings up the **Select elements...** screen, as shown below.



The Select Elements Screen

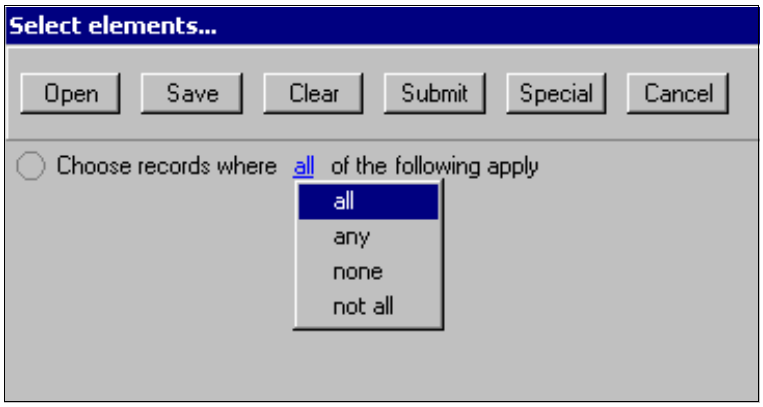
An **element** is the chemical-facility-pathway-year specific building block of the RSEI model. The unitless numerical value that describes the relative risk for each element is called a score.

Opening Existing Selections

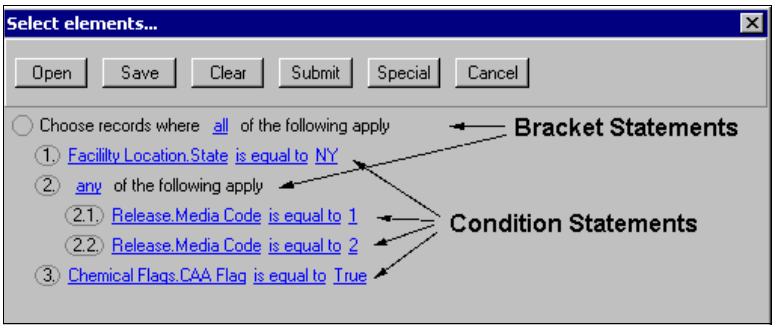
The **Open** button loads the selection statements for selections that have already been saved. The default directory for saved selections is C:\My Documents. Users can also store selections in the C:\Program Files\RSEI\User directory. Once opened, click **Submit** to run the selection.

New Selections

Each selection is made up of one or more selection statements, which tells the model what kind of records you want to pull out of the database. Each record is an element- the building block of the model that defines a chemical release to a specific exposure pathway. There are two parts to a each selection statement– bracket statements and condition statements. Bracket statements tell the model how to interpret a list of conditions. Bracket statements always come immediately before a condition or a list of conditions. When you click on the **Select** button and the **Select elements...** screen opens, the first line of text in the dialog box is a bracket statement, "Choose records where all of the following apply." This bracket statement tells the model that a list is coming, and to only select those scores to which ALL of the conditions in the list apply. If you click on all, a drop-down box will appear with other choices: any, none, or not all.



When you open the **Select elements...** screen, the most recent selection you submitted is displayed. You can either modify this selection and resubmit it, or click the **Clear** button at the top of the screen to remove all but the very first bracket statement.



Condition statements are the actual criteria you use to select elements. For instance, a condition could be that the facility releasing the chemical is located in New York, or that the chemical being released is benzene. Condition statements can pull out any variable that is included in the model, and select elements that are equal to the criteria you enter, or not equal, less than, greater than, etc. With the combination of bracket and condition statements, you can construct very complex selections to pull out only those elements you are interested in.

- ## Adding Selection Statements

When you open the **Select elements...** screen by clicking on the **Select** button, you will see one line of text that says, 'Choose records where all of the following apply.' This is your first bracket statement, and tells the model how to interpret the condition or list of conditions that comes next. If you click on all, you can change how the model interprets the ensuing list. You have the following options:

A selection statement consists of at least one bracket statement and one condition statement.

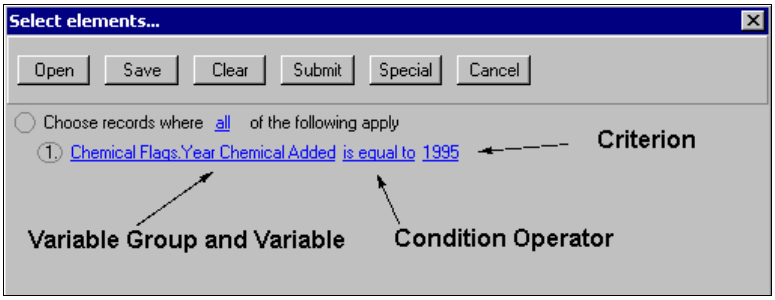
Bracket Operator	Definition
all	Every condition in the next list must apply for a record to be selected.
any	At least one condition in the next list must apply for a record to be selected.
none	All of the conditions in the next list must NOT apply for a record to be selected.
not all	At least one of the conditions in the next list must NOT apply for a record to be selected.

Once you have decided how you want to define your bracket statement, click on the circle to the left of the text. Click 'Add Condition' in the drop down menu. The following text line will appear:

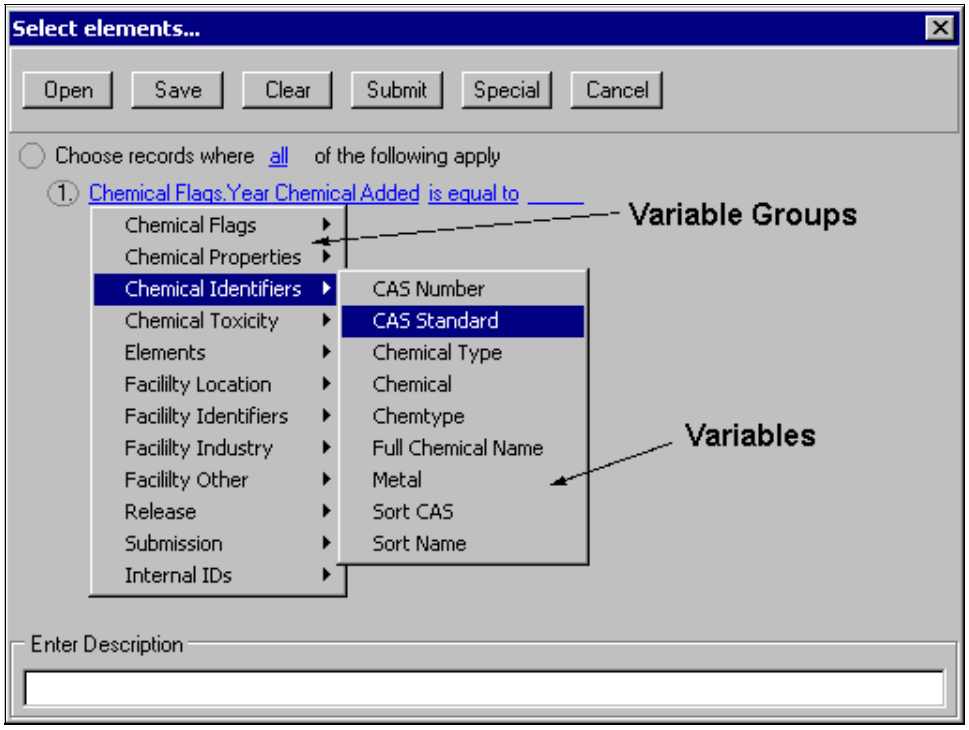
1. Chemical Flags. Year Chemical Added is equal to ___

This is your first condition statement. The first part of the condition, where it says, 'Chemical Flags,' is the variable group. 'Chemical Flags' is shown as the default text because it happens to be the first variable group in the drop down menu. Click on that part of the text, and a drop down box will show the 12 available variable groups. Click on any group name, and a list of the variables in that group will appear in a menu to the right. See the end of this chapter for a complete listing of all the groups and variables. Click on the desired variable. The variable group and variable name will now show in the text line. Note that a period separates the variable group name from the variable name.

The second part of the condition is the condition operator. Click on the phrase 'is equal to,' and a drop down will appear with a list of other available operators. Click on the condition operator desired, and it will appear in the text line. Note that the operator 'between' is inclusive: 'is between 1 and 3' will select 1, 2 and 3.



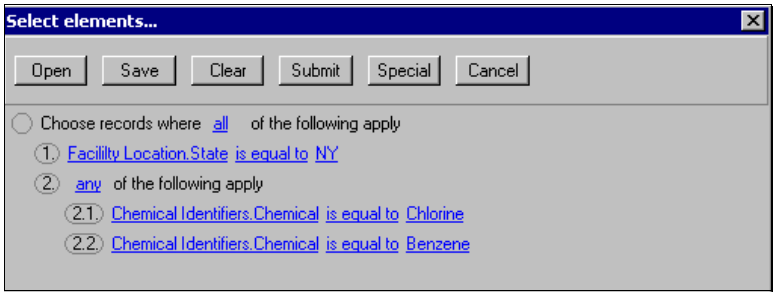
The third part of the condition is the criterion itself. Depending on the variable you entered, you may have to enter text or numbers in the space, or if you click on that space, a list of possible entries for you to choose from may appear. Consult the variable list at the end of this chapter for the correct entry format for each variable. Note that after you enter your criterion, you must click somewhere in the window outside of the box you just typed in, so that the entire text line turns blue (this enters your change).



Once you have completed your selection statement, you can either submit it (by clicking the **Submit** button) or further refine it by adding more conditions and/or selection statements.

To add more conditions within the same bracket statement, click on the '1' to the left of your first condition, then click 'Add condition.' A new text line will appear, which you can change to reflect your desired criterion. Remember that because you are within the same bracket statement, the model will evaluate this condition along with the first, according to whatever bracket operator you selected in the bracket statement. For instance, if you selected 'any' as your bracket statement operator (in the first text line), your first condition was 'Facility Location.State is equal to NY' and your second condition was 'Chemical Identifiers.Chemical is equal to Benzene,' the model will return all releases from facilities in New York (regardless of the chemical) PLUS all releases of benzene in the U.S. (regardless of the state). If what you really wanted was all releases of benzene from New York, change the bracket statement operator in the first text line to 'all'. Then the model will only select those releases that are 1) from facilities in New York, and also 2) benzene releases.

You can also add additional selection statements. Having more than one selection statement is useful when you want to use different operators on different sets of criteria. For instance, consider the example above of benzene releases in New York. Perhaps you would like to look more closely at benzene releases *and* chlorine releases in New York. In this case, you cannot simply add another condition statement for chlorine (with 'all' as the bracket operator), because the model will then look for releases that are 1) from facilities in New York, 2) benzene releases, and 3) chlorine releases, which is not logically possible. So here you can use an additional bracket statement to group together benzene and chlorine, and direct the model to pick releases that are either one.



To select benzene and chlorine releases in New York, keep the first text line as is, so it reads 'Choose records where all of the following apply.' Then click on the circle to the left of the text line, and choose 'Add Condition.' For the first condition, enter 'Facility Location. State is equal to NY.' Then click on the '1' next to the condition, and click 'Add Bracket.' Change 'all' to 'any'. In line 2.1, which is the first condition of your new selection statement, change the variable to read, 'Chemical Identifiers.Chemical is equal to Benzene.' Then click on the circled '2.1', and click "Add Condition.' A new line 2.2 will appear. Change that line so it reads 'Chemical Identifiers.Chemical is equal to Chlorine.' Now the model will understand this selection as selecting all releases that are 1) from facilities in New York, and 2) Benzene OR Chlorine.

Note that the selection statements work similarly to outlines. How a line is indented shows you what grouping it belongs to. The first line (the initial bracket statement) will always apply to the entire selection, and all additional selection statements are nested within it. Refer to the example selection statements at the end of this chapter for ideas on how to build complex selections with multiple selection statements.

- **Deleting Selection Statements**

To delete statements, click on the circle to the left of the text line you no longer want, then click 'Delete Current Row'. If the text line you delete is a bracket statement with conditions underneath it, those conditions will also be deleted. Note that the first bracket statement cannot be deleted. Clicking on the **Clear** button will erase your entire selection.

- **'Special' Button**

Under the **Special** button in the **Select elements...** screen, there are two options that allow you to create two different types of selections with multiple condition statements quickly and easily. The "SIC code chain" option will automatically select all those facilities that report the 4-digit SIC code you enter as any one of their six reported SIC codes. The 'Read Facility IDs from File' option allows you to import a text file containing a list of TRI facility IDs that you wish to use in your selection. The list should be in a plain text file (extension .txt with no extraneous formatting) with each facility ID followed by a hard return, and no hard return after the very last entry. After entering either option, the model will add a sequence of condition statements to the selection window. You can then further modify your selection.

- **Saving/Opening Selections**

The RSEI model allows you to save your selection statements, so that you can either use the selection again in a later analysis, or just use the selection statements as a starting point for a similar selection. In the box at the bottom of the screen, beneath 'Enter Description' you can enter a fairly lengthy text description of your selection that will be displayed the next time you open it. Click the **Save** button at the top of the screen, and the selection will be saved to your hard drive. Note that this only saves the selection itself, not the results of the selection. Next time you open it (using the **Open** button at the top left), you will have to resubmit in order to use the resulting set.

- **Submitting Your Selection**

When you are finished building your selection, click on **Submit** to run it. Depending on your computer's memory (RAM) and the size of the requested set, your selection may take up to 30 minutes or longer to finish. Shorter selections, such as all facilities in one state for one year, should be done in under five minutes.

At any time, if you forget what your selection is, click on the text that lists the number of selected facilities, releases, and elements in the far upper right of the screen. A selection box will appear reminding you of your selection statements.

Variable Descriptions

The following tables describe the variables and variable groups that you can use to build your selection. Each table also provides the correct entry format for each variable, or notes that the model contains a list to select from.

NOTE: It is important to use the entry format listed (e.g., use all capitals if indicated). Otherwise, your selection will contain incorrect data, or will not return any results at all.

• Chemical Flags

Chemical flags indicate whether a chemical is in a particular group of interest. For example, as noted below, chemicals with primary or secondary drinking water standards under the Safe Drinking Water Act contain the word 'True' in the SDWA Flag field. Additional information on chemical flags is provided in Appendix G.

Table 5-1. Chemical Flags

Variable	Description	Format for Entering Information/ Possible Values
Year Chemical Added	The year the chemical was added to the Toxics Release Inventory	Choices are: 1987 - 1995 Enter all four digits when building your selection [e.g., 1988]
CAA Flag	This flag marks the chemicals that are Clean Air Act pollutants.	True [chemical meets this criterion] False [chemical does not meet this criterion]

Table 5-1. Chemical Flags

Variable	Description	Format for Entering Information/ Possible Values
CERCLA Flag	This flag marks the chemicals that are regulated under Superfund (CERCLA—the Comprehensive Environmental Response, Compensation, and Liability Act).	True [chemical meets this criterion] False [chemical does not meet this criterion]
Core Chemical Flag	This flag marks the chemicals that are common to all reporting years of TRI *and* that have had no modifications of reporting requirements.	True [chemical meets this criterion] False [chemical does not meet this criterion]
Expansion Flag	This flag marks the chemicals that were added to the Section 313 toxic chemical list for reporting in 1995 and later years.	True [chemical meets this criterion] False [chemical does not meet this criterion]
HAP Flag	This flag marks the chemicals that are hazardous air pollutants, as defined by the Clean Air Act.	True [chemical meets this criterion] False [chemical does not meet this criterion]
OSHA Carcinogens	This flag indicates whether the chemical is a known or suspect human carcinogen based on OSHA criteria (U.S. EPA, 1998). Known human carcinogens are defined as those that have been shown to cause cancer in humans. Suspect human carcinogens have been shown to cause cancer in animals. The list of chemicals flagged as OSHA carcinogens is based on the list of carcinogens provided in the 1997 TRI Public Data Release, which was compiled from the following sources: the National Toxicology Program's *Annual Report on Carcinogens*, the International Agency for Research on Cancer *Monographs*, and 29 CFR 1910[19].	True [chemical meets this criterion] False [chemical does not meet this criterion]

[19] Even if a chemical is flagged as an OSHA carcinogen, its toxicity weight for a given exposure pathway may not be based on its carcinogenic effects. For example, a chemical that causes both carcinogenic and noncarcinogenic effects when inhaled may have a higher inhalation toxicity weight associated with noncarcinogenic effects than with its carcinogenic effects. If you wish to view all chemicals that have inhalation toxicity weights based on cancer health effects, see the *Toxicity Class - Inhale* field. To obtain a list of chemicals that have toxicity weights based only on cancer health effects, see the *Toxicity Category* field.

Table 5-1. Chemical Flags

Variable	Description	Format for Entering Information/ Possible Values
Priority Pollutant Flag	This flag marks the chemicals that are priority pollutants, as defined by the Clean Water Act.	True [chemical meets this criterion] False [chemical does not meet this criterion]
33/50 Flag	This flag is a marker which indicates that the chemical is included in EPA's 33/50 program, a program in which facilities voluntarily reduce their chemical releases by 33 percent and 50 percent by certain dates.	True [chemical meets this criterion] False [chemical does not meet this criterion]
PBT Flag	Indicates whether EPA has designated this chemical as a priority chemical under the Persistent Bioaccumulative and Toxic (PBT) Chemical Program.	True [chemical meets this criterion] False [chemical does not meet this criterion]
SDWA Flag	This flag marks the chemicals that have national primary or secondary drinking water standards under the Safe Drinking Water Act.	True [chemical meets this criterion] False [chemical does not meet this criterion]
User Tags 1 through 5	Using these tags, you can select a set of chemicals based on your own selection criteria. This feature is not yet implemented.	You can implement User Tags by entering 'True' in the appropriate field (e.g., User Tag 1) of the database file chemical.db for the chemicals of interest. The labels for the User Tag fields cannot be edited; therefore, the user must remember what each tag represents when building a selection,
High Production Volume Flag	This flag marks the chemicals that are included in EPA's High Production Volume program.	True [chemical meets this criterion] False [chemical does not meet this criterion]

• Chemical Properties

Chemical properties are used in the model to estimate fate and transport of the chemicals in soil, water, and air. Because of the number of chemicals in the model, there may be a wide range of values associated with each property. In addition, there may be no information available for some chemicals and properties. For convenience, the approximate range of properties for chemicals currently in the model is presented in the following table.

Table 5-2. Chemical Properties

Variable	Description	Format for Entering Information/ Possible Values
Air Decay (1/hr)	The rate at which a chemical degrades in air, due primarily to photooxidation by radicals (hr^{-1}).	Range is 0.000000324 to 276.
BCF (L/kg)	Bioconcentration factor: the ratio of a chemical's concentration in fish to its concentration in water at equilibrium (L/kg).	Range is 0 to 550,000.
H_2O Decay (1/hr)	The rate at which a chemical degrades in water, due to abiotic hydrolysis, biodegradation, or photolysis (hr^{-1}).	Range is 0 to 276.
Henrys (atm/(mole/m^3))	Henry's law constant: the ratio of a chemical's concentration in the air to its concentration in the water at equilibrium (atm·m^3/mol).	Range is 9.11 e-44 to 94.5.
Incinerator DRE (pct)	Destruction/removal efficiencies, expressed as the percent of chemical fed to the incinerator that is not released to the air.	Range is 88.5 to 99.9999
K_d (L/kg)	The soil-water partition, or distribution, coefficient. For organics, the value is often estimated as the product of K_{oc} and f_{oc} (the fraction of organic carbon in the soil) (L/kg).	Range is 4 to 4100.
K_{oc} (mL/g)	The organic carbon-water partition coefficient, used in estimates of chemical sorption to soil (mL/g).	Range is 1 to 10,000,000,000.

Table 5-2. Chemical Properties

Variable	Description	Format for Entering Information/ Possible Values
$LOGK_{ow}$	The logarithm of the octanol-water partition coefficient. K_{ow} is the ratio of a chemical's concentration in the octanol phase to its concentration in the aqueous phase at equilibrium in a two-phase octanol/water system.	Range is -7.18 to 12.11.
Molecular Weight (g/mole)	The mass in grams of one mole of molecules of a chemical compound.	Range is 9.01 to 1,052.7
POTW Partition (Biod) (pct)	Percent of total POTW (Publicly Owned Treatment Works) removal efficiency attributable to biodegradation of the chemical.	Range is 0 to 100.
POTW Partition (Removal) (pct)	Percent of chemical removed from the wastewater by the POTW.	Range is 1.85 to 100.
POTW Partition (Sludge) (pct)	Percent of total POTW removal efficiency attributable to sorption of the chemical to sewage sludge.	Range is 0 to 100.
POTW Partition (Volat) (pct)	Percent of total POTW removal efficiency attributable to volatilization of the chemical.	Range is 0 to 99.01.
Water Solubility (mg/L)	The amount of chemical that dissolves in water at a particular temperature, usually 25 degrees Celsius (mg/L).	Range is 0 to 3,320,000.

- **Chemical Identifiers**

Chemicals can be identified by common or scientific name and by the Chemical Abstracts Service (CAS) Registry number. Chemicals may have more than one common (or scientific name), but they have only one CAS Number. Another important identifier is whether or not the chemical is a metal. Also, the designation of core chemical, as noted below, indicates whether or not facilities have been required to report releases of the chemical during all years of TRI reporting included in the RSEI Model, without any changes or modifications to the chemical's reporting requirements.

Table 5-3. Chemical Identifiers

Variable	Description	Format for Entering Information/ Possible Values
CAS Number	Chemical Abstracts Service Registry Number, which identifies a unique chemical. For chemical categories, CAS Numbers begin with "N", followed by three digits.	Select from list.
CAS Standard	The Chemical Abstracts Service Registry Number identifies a unique chemical. The standard format contains three sets of numbers divided by hyphens (00-00-0).	Select from list.
Chemical Type	This identifier is not yet active.	
Chemical	Common name(s) of the chemical.	Select from list.
ChemType	This identifier is not yet active.	
Full Chemical Name	Full scientific name(s) of the chemical.	Enter as text with initial capital (not recommended- Use of variable 'Chemical' is more reliable.)
Metal	This flag indicates whether the chemicals are metals and also whether they are core chemicals. (Core chemicals are those that are common to all reporting years of TRI and which have had no modifications of reporting requirements.)	Choices are: M [metal]; CM [core metal]; NM [non-metal]; or CNM [core non-metal]
Sort CAS	Chemical Abstracts Service Registry Number, which identifies a unique chemical. For chemical categories, CAS Numbers begin with "N", followed by three digits.	Enter without hyphens (functions same as variable 'CAS Number')
Sort Name	Common name of chemical, with initial modifiers moved to end of name. Used for internal sorting purposes.	Enter as text with initial capital (not recommended- Use of variable 'Chemical' is more reliable.)

• Chemical Toxicity

A variety of toxicity information is stored in the RSEI Model, ranging from information that makes up the underlying non-cancer and cancer toxicity values to the actual toxicity weights assigned to the chemicals using the method applied by the RSEI Model. You can choose subsets any of these variables when building your selection. See Chapter 1 for a description of toxicity data in the model and for information on the method used to assign toxicity weights.

Table 5-4. Chemical Toxicity

Variable	Description	Format for Entering Information/ Possible Values
Inhale Tox Weight	The TRI Indicator toxicity weight for a chemical for the inhalation pathway.	Range is 0.036 to 1,000,000.
MCL (mg/L)	EPA's current Maximum Contaminant Level, which is the national primary drinking water standard for the chemical.	Range is 0.00005 to 10.
Oral Tox Weight	The TRI Indicator toxicity weight for a chemical for the oral pathway.	Range is 0.0023 to 1,000,000.
QSTAR Oral (1/mg/kg-day)	The oral cancer slope factor (q_1^*): a measure of the incremental lifetime risk of cancer by oral intake of a chemical, expressed as risk per mg/kg-day.	Range is 0.000012 to 230.
RfC Conf.	Confidence levels are assigned to the study used to derive the RfC, the overall database, and to the RfC itself.	Three levels may be assigned: H [high] M [medium] L [low]
RfC Inhale (mg/m^3)	The inhalation reference concentration (RfC) is defined as "an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious noncancer health effects during a lifetime" (U.S. EPA, 1994).	Range is 0.00002 to 50.

Table 5-4. Chemical Toxicity

Variable	Description	Format for Entering Information/ Possible Values
RfC MF	The modifying factor (MF) is a value applied to the NOAEL when scientific uncertainties in the study chosen for estimating the RfC are not explicitly addressed by the standard UFs.	Three values may be assigned: 1.0 3.0 10.0
RfC UF	The uncertainty factor (UF) is applied to the no-observed-adverse-effect level (NOAEL) upon which the RfC is based, thereby reducing the dose. The UF accounts for uncertainties in extrapolation from experimental data to an estimate appropriate to humans.	Range is 10 to 10,000.
RfD Conf.	Confidence levels are assigned to the study used to derive the RfD, the overall database, and to the RfD itself.	Three levels may be assigned: H [high] M [medium] L [low]
RfD MF	The modifying factor (MF) is a value applied to the NOAEL when scientific uncertainties in the study chosen for estimating the RfD are not explicitly addressed by the standard UFs.	Four values may be assigned: 1.0 3.0 5.0 10.0
RfD Oral (mg/kg-day)	The oral reference dose (RfD) is "an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure [*by ingestion*] to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime" (Barnes, 1988).	Range is 0.000007 to 220.
RfD UF	The uncertainty factor (UF) is applied to the no-observed-adverse-effect level (NOAEL) upon which the RfD is based, thereby reducing the dose. The UF accounts for uncertainties in extrapolation from experimental data to an estimate appropriate to humans.	Range is 1 to 30,000.

Table 5-4. Chemical Toxicity

Variable	Description	Format for Entering Information/ Possible Values
Toxicity Category	This indicates whether the oral and inhalation toxicity weights are based on cancer health effects, non-cancer health effects, or both.	Choices are: **Carcinogen** [indicates that the chemical's most sensitive endpoint for both exposure pathways is cancer]; **Non-carcinogen** [indicates that the chemical's most sensitive endpoint for both exposure pathways is noncancer effects]; and **Mixed** [indicates that the chemical's most sensitive endpoint varies by exposure pathway]
Toxicity Class - Inhale	This indicates whether the toxicity weight for the inhalation pathway is based on cancer or noncancer health effects.	Choices are: **Carcinogen** [indicates that the chemical's most sensitive endpoint for the inhalation pathway is cancer]; **Non-carcinogen** [indicates that the chemical's most sensitive endpoint for the inhalation pathway is noncancer effects]; **Carcinogen***; and **Non-carcinogen***. An asterisk indicates that the toxicity weight came from the oral exposure pathway.
Toxicity Class - Oral	This indicates whether the toxicity weight for the oral pathway is based on cancer or noncancer health effects.	Choices are: **Carcinogen** [indicates that the chemical's most sensitive endpoint for the oral pathway is cancer]; **Non-carcinogen** [indicates that the chemical's most sensitive endpoint for the oral pathway is noncancer effects]; **Carcinogen***; and **Non-carcinogen***. An asterisk indicates that the toxicity weight came from the inhalation pathway.

Table 5-4. Chemical Toxicity

Variable	Description	Format for Entering Information/ Possible Values
Toxicity Source	Source of toxicity information	Choices are: IRIS, HEAST, OPP, CalEPA or DERIVED
Unit Risk Inhale (1/mg/m^3)	The unit inhalation risk is the excess lifetime risk due to a "continuous constant lifetime exposure of one unit of carcinogen concentration"(51 FR 33998).	Range is 0.000004 to 67.
WOE	Weight of evidence (WOE) categories indicate how likely a chemical is to be a human carcinogen, based on considerations of the quality and adequacy of data and the type of responses induced by the suspected carcinogen. EPA WOE classifications include the following categories and associated definitions (51 FR 33996): A Carcinogenic to humans B Probable carcinogen based on: •B1 Limited human evidence •B2 Sufficient evidence in animals and inadequate or no evidence in humans C Possible carcinogen D Not classifiable E Evidence of non-carcinogenicity	Choices are: A B1 B2 C D E

- **Elements**

The variables in the following table are associated with the elements generated by the RSEI Model. In general, the information in the following table describes output from the model or describes the variables as used in the model.

Table 5-5. Elements

Variable	Description	Format for Entering Information/ Possible Values
Pounds (Post treatment)	Total pounds released associated with each element after any treatment by POTWs or offsite facilities.	Range is 0 to 620,000,000.
Population	Exposed population associated with each element.	Range is 0 to 1,132,916,864.
Score	Indicator Element Score.	Range is 0 to 5,840,041.50
Score Category Code	Codes corresponding to the medium into which the chemical is released. Examples of the information include: direct air releases from the stack using a "rural" air dispersion model, fugitive air releases, releases to an onsite landfill.	Choices are 0-33 [See Table 9-3 in Chapter 9 for descriptions]
Score Category Text	Descriptions of release media and other descriptors corresponding with the score category codes.	See Table 9-3 in Chapter 9 for descriptions. [The descriptions in Table 9-3 are not the exact descriptions included in the model; it is recommended that you use the Media Codes when building your selection rather than these media descriptions]
Score Children < 10	Indicator Element Score for children less than ten years old.	Range is 0 to 1,364,812.25.
Score Children 10 to 17	Indicator Element Score for children between ten and 17 years of age (inclusive).	Range is 0 to 892,051.38.
Score Males 18 to 44	Indicator Element Score for males 18 years old through 44 years old (inclusive).	Range is 0 to 1,499,198.75.
Score Females 18 to 44	Indicator Element Score for females 18 years old through 44 years old (inclusive).	Range is 0 to 1,224,584.
Score Adults 65 and older	Indicator Element Score for adults 65 years old and greater.	Range is 0 to 1,054,271.38.

- **Facility Location**

One or more facilities can be used in a selection based on location. For example, a single facility may be located using the street address, or all facilities in a state may be chosen. Facilities can also be chosen based on their distance from the nearest stream reach or the nearest weather station (WBAN). All variables that can be used to select facilities based on location are listed in the following table:

Table 5-6. Facility Location

Variable	Description	Format for Entering Information/ Possible Values
City	City where the TRI facility is located	Enter city name using all capital letters.[1]
County	County where the TRI facility is located	Enter county name using capital letters.[1] Because more than one state may contain a given county name, the preferred entry format is to enter the **two letter state postal code followed by a comma and the county name** (with no space between state and county). For example, Prince George's County, Maryland should be entered as: "MD,PRINCE GEORGES" *(Note that although there is no space between the state and the first name of the county, there **is** a space between words in the county name.)* Alternatively, one can subset both state and county together. In addition, counties beginning with 'Mc' should be entered like 'Mc Donald,' with a space between 'Mc' and the rest of the word.
Distance to Stream	The distance between a facility discharging to water and the reach of the receiving water body (km).	Range is 0 to 3,999.74.
Distance to WBAN	The distance between a facility and the nearest weather station (km).	Range is 0 to 395,084.77.

Table 5-6. Facility Location

Variable	Description	Format for Entering Information/ Possible Values
FIPS	TRI facility FIPS (Federal Information Processing Standard) code which identifies the county associated with the facility	Enter code using leading zeros if code is less than five digits.
Latitude	TRI facility latitude	Range is -14.29 to 66.43.
LLM	Internal code	
Longitude	TRI facility longitude	Range is -170.69 to 145.71.
EPA Region	EPA region where facility is located. There are 10 EPA regions. Any information which cannot be matched to an actual EPA region (e.g., an unrecognized ZIP code) is assigned to a dummy region (called UK)	Enter EPA region number 1 through 9.
On Tribal Land	Flag indicating whether facility is located on a tribal land.	True [facility is on tribal land] False [facility is not on tribal land]
Tribal Land Name	Name of tribal land on which facility is located.	Enter text.
State	State in which the facility is located	Enter the two character state postal code, using all capital letters
Street	Street address of facility.	Enter text. (Not recommended unless exact entry from Form R is known)
X	Assigned grid value based on latitude	Range is -18,380.5 to 145.71.
Y	Assigned grid value based on longitude	Range is -1,587.5 to 7,382.5.
ZIPCode	Facility ZIP code	Enter five digits[2]

[1]Because there may be some variation in the spelling of city, county, or facility names in the TRI database, you may need to enter several spellings of the item you are interested in. For example, to obtain data for St. Louis, Missouri, you should enter all of the following city spellings:
SAINT LOUIS
ST. LOUIS
ST LOUIS

[2]Over the years covered by the model, some ZIP codes have been deleted, others have been reassigned, and yet others have been added. Thus, when doing regional selections, use of city, county, state, or region is advisable.

! Facility Identifiers

Some users may be familiar with facility identifiers, and may wish to use this information to choose the facilities of interest. A variety of identifiers, from the name as reported to TRI to identifying numbers associated with marketing data (DUNS numbers) are listed in the following table, along with the formats required when selecting the facilities:

Table 5-7. Facility Identifiers

Variable	Description	Format for Entering Information/ Possible Values
DUNS	The 9-digit number assigned by Dun & Bradstreet for the facility or establishment within the facility.	Enter the nine digits
Facility ID	Unique TRI identifier for facility	Enter the 15 character TRI identifier, using digits and upper case letters.
Name	TRI facility name	Enter name using capital letters.[1]
Near Stream	USGS Reach Identifier (Concatenation of Catalog, Unit, Segment)	Enter the 11 digits.
NPDES Permit Number	Permit number issued by US EPA for facilities discharging to water.	Enter the nine digits
Parent DUNS	The 9-digit number assigned by Dun & Bradstreet for the US parent company	Enter the nine digits
Parent Name	Name of the corporation or other business entity located in the U.S. that directly owns at least 50 percent of the voting stock of the facility	Enter name using all capital letters
RCRA Number	Number assigned by EPA to facilities handling hazardous waster under the Resource Conservation and Recovery Act.	Enter the 12 digits.
WBAN ID	The ID assigned to the Weather Bureau/Army/Navy Weather Station nearest to the facility.	Enter 1 to 3 digits.

[1]Because there may be some variation in the spelling of city, county, or facility names in the TRI database, you may need to enter several spellings of the item you are interested in. For example, to obtain data for St. Louis, Missouri, you should enter all of the following city spellings: SAINT LOUIS, ST. LOUIS, ST LOUIS

! Facility Industry

A subset of all industries are required to report their releases to TRI. Specifically, *all* facilities within 2-digit Standard Industrial Classification (SIC) codes 20 through 39 must report releases (if those releases exceed given thresholds), and *selected* facilities within SIC codes 10, 12, 49, 51, and 73 must report their releases. A given facility may produce more than one type of product or may be associated with more than one type of activity, and therefore, the facility may report up to six SIC codes on TRI Form R. See Appendix A for a list of the industries associated with 2-digit and 3-digit SIC codes. The following table describes all variables used in the model.

Table 5-8. Facility Industry

Variable	Description	Format for Entering Information/ Possible Values
EPA SIC Code 2 Digit	EPA standardized 2-digit SIC code. This code uses all SIC codes reported by a facility to arrive at a single 2-digit code for the facility, if applicable. If reported 4-digit codes differ in the first two digits, the "multiple code" is used.	Choices are: 20-39, MU [for multiple codes within the range of 20-39], NA [for any other codes]
Federal Facility Flag	Code that indicates whether a facility is considered federal for purposes of Executive Order 12856.	Choices are: C = commercial; F = federal; or G = government contractor.
SIC Code 1	First facility 4-digit SIC code reported on Form R	Select from list.
SIC Code 2	Second 4-digit SIC code reported on Form R	Select from list.
SIC Code 2 Digit	First 2 digits of first SIC code	Enter two digits
SIC Code 3	Third 4-digit SIC code reported on Form R	Select from list.
SIC Code 3 Digit	First 3 digits of first SIC code	Enter three digits.
SIC Code 4	Fourth 4-digit SIC code reported on Form R	Select from list.
SIC Code 5	Fifth 4-digit SIC code reported on Form R	Select from list.
SIC Code 6	Sixth 4-digit SIC code reported on Form R	Select from list.

! Facility Other

Facility-specific information is used to model air releases from the facility. For example, unique stack heights are used where available. Stack-specific variables are described in the following table:

Table 5-9. Facility Other

Variable	Description	Format for Entering Information/ Possible Values
Stack Diameter	Diameter of facility stack that is emitting the pollutant (m)	Range is 0.003 to 36.58.
Stack Diameter Source	Source of information on stack diameter	Choices are: **Calif** [facility-specific data obtained from California state database]; **EPRI fac** [facility-specific data provided by the Electric Power Research Institute]; **EPRI med** [the overall median of coal/oil electric utilities provided by the Electric Power Research Institute]; **Fac Spec** [facility-specific data obtained from AFS or NET]; **New York** [facility-specific data obtained from New York state database]; **Overall** [median of all facilities obtained from AFS and NET]; **SIC 2dig** [median of all facilities in 2-digit SIC code obtained from AFS and NET]; **SIC 3dig** [median of all facilities in 3-digit SIC code obtained from AFS and NET]; **Wisc** [facility-specific data obtained from Wisconsin state database].
Stack Height	Height of facility stack that is emitting the pollutant (m)	Range is 0.3 to 366.96.
Stack Height Source	Source of information on stack height	See Stack Diameter Source.
Stack Velocity	Rate at which the pollutant exits the stack (m/s)	Range is 0 to 215.8.
Stack Velocity Source	Source of information on stack velocity	See Stack Diameter Source.

! Release

The following table includes variables similar to some of the variables described in the Elements table. The main difference, however, is that the following variables reflect the information as reported by facilities to the TRI rather than information specific to the method used to model releases in the RSEI Model. For example, there is a Media Code for releases to the air from the facility stack (i.e., Stack Air), but there is no indication of whether the release occurs in an urban or rural area (a distinction used in the air dispersion models).

Table 5-10. Release

Variable	Description	Format for Entering Information/ Possible Values
Media Text	Descriptions of receiving media associated with Media Codes	See Table 9-2 in Chapter 9 for descriptions of Media Codes. [The descriptions in Table 9-2 are not the exact descriptions included in the model; it is recommended that you use the Media Codes when building your selection rather than these media descriptions]
Media Code	Code associated with the media and/or method of release	Enter digits using the codes listed in Table 9-2 in Chapter 9.
Pounds Released	Number of pounds released into this media (lbs).	Range is 1 to 620,000,000.

! Submission

Information other than media-specific releases and SIC codes is submitted by facilities to TRI, and is retained in the model. This information is described in the following table:

Table 5-11. Submission

Variable	Description	Format for Entering Information/ Possible Values
DCN	Unique document control number assigned by TRI to each submission by a reporting facility .	Enter 13 digits.
Max Amount Onsite	Maximum amount of chemical stored onsite in any given calendar year	Enter digits using the codes listed in Table 9-4 in Chapter 9.
Total Pounds to All Media	Combined releases to all media for each TRI submission.	Range is 1 to 695,010,760.
Chemical Use Code	Code describing whether chemical is manufactured, processed, or otherwise used at the facility.	Enter letter using the codes listed in Table 9-4 in Chapter 9.
Long/Short Form	Code describing whether data was submitted via the TRI long form or the TRI short form.	Enter L for long form and S for short form.
Year	Reporting year of interest.	Enter all four digits, e.g., 1997

! Internal IDs

Numbers assigned within the RSEI Model can be used to identify facilities, chemicals, and releases. Use the following formats for building selections using these numbers:

Table 5-12. Internal IDs

Variable	Description	Format for Entering Information/ Possible Values
Element Number	Unique identifier for Indicator Elements.	Range is 2 to 4421397.
Release Number	Unique identifier for facility releases.	Range is 163,528 to 2,639,857.
Chemical Number	Unique identifier for TRI chemicals.	Range is 1 to 609.
Facility Number	Unique identifier for TRI facilities.	Range is 1 to 44164.
Submission Number	Unique identifier for submissions.	Range is 81,085 to 1,079,473.

Examples of Complex Selections

Example 1

Suppose you want to look at air releases of chemicals that are Clean Air Act pollutants or Hazardous Air pollutants. You have already looked at California specifically, so you are not interested in releases from that state. In addition, you have already looked at benzene and toluene releases by themselves, so you would like to exclude them, too. Your selection would look like the following:

F Choose records where all of the following apply
1. Facility Location.State is not equal to CA
2. any of the following apply
    2.1. Chemical Flags. HAP Flag is equal to True
    2.2. Chemical Flags. CAA Flag is equal to True
3. Chemical Identifiers.Chemical is not equal to Benzene
4. Chemical Identifiers.Chemical is not equal to Toluene
5. any of the following apply
    5.1. Release Media.Code is equal to 1
    5.2. Release Media.Code is equal to 2

Example 2

Suppose you want to look at a specific industry, for instance paints and allied products, SIC code 2851. Because reporting facilities are allowed to report up to six 4-digit SIC codes, to be sure that you select all of the facilities in the industry, it is safest to allow the selection of a facility with that SIC code in any one of those six fields. Suppose you are also only interested in releases of OSHA carcinogens, and only those facilities in Texas. Your period of interest is 1994 to the present, and you want to exclude large facilities that release over 1,000,000 pounds annually. Your selection would look like the following:

F Choose records where all of the following apply

1. any of the following apply
    - 1.1. Facility Industry.SIC Code 1 is equal to 2851
    - 1.2. Facility Industry.SIC Code 2 is equal to 2851
    - 1.3. Facility Industry.SIC Code 3 is equal to 2851
    - 1.4. Facility Industry.SIC Code 4 is equal to 2851
    - 1.5. Facility Industry.SIC Code 5 is equal to 2851
    - 1.6. Facility Industry.SIC Code 6 is equal to 2851
2. Facility Location.State is equal to TX
3. Chemical Flags.OSHA Carcinogens is equal to True
4. Submission.Total Pounds is less than 1000000
5. Submission.Year is greater than 1993

Example 3

Suppose you want to look at a full trend over time in risk-related scores. As noted previously, changes have been made to the TRI reporting requirements that need to be accounted for when doing time trend analyses. The first change is that TRI has added and deleted chemicals from the list of reportable chemicals, and changed how some chemicals are reported. The RSEI model includes a Flag called 'Core Chemical,' that marks only those chemicals that have been reported over the entire time period of TRI reporting with no changes in the details of their reporting requirements. The second change is that in 1998 TRI required facilities in new SIC codes to report. These facilities must be excluded to get an accurate time trend. And, if you are only interested in risk-related scores, you can limit your selection to the media that are fully modeled (air and direct water releases). Your selection would look like the following:

F Choose records where all of the following apply

1. Chemical Flags.Core Chemical Flag is equal to True
2. none of the following apply
    - 2.1. Facility Industry.SIC Code 1 is equal to 1021
    - 2.2. Facility Industry.SIC Code 1 is equal to 1031
    - 2.3. Facility Industry.SIC Code 1 is equal to 1041
    - 2.4. Facility Industry.SIC Code 1 is equal to 1044
    - 2.5. Facility Industry.SIC Code 1 is equal to 1061
    - 2.6. Facility Industry.SIC Code 1 is equal to 1099
    - 2.7. Facility Industry.SIC Code 1 is equal to 1221
    - 2.8. Facility Industry.SIC Code 1 is equal to 1222
    - 2.9. Facility Industry.SIC Code 1 is equal to 1231
    - 2.10. Facility Industry.SIC Code 1 is equal to 4911
    - 2.11. Facility Industry.SIC Code 1 is equal to 4931
    - 2.12. Facility Industry.SIC Code 1 is equal to 4939
    - 2.13. Facility Industry.SIC Code 1 is equal to 4953
    - 2.14. Facility Industry.SIC Code 1 is equal to 5169
    - 2.15. Facility Industry.SIC Code 1 is equal to 5171
    - 2.16. Facility Industry.SIC Code 1 is equal to 7389
3. Release.Media Code is less than or equal to 3

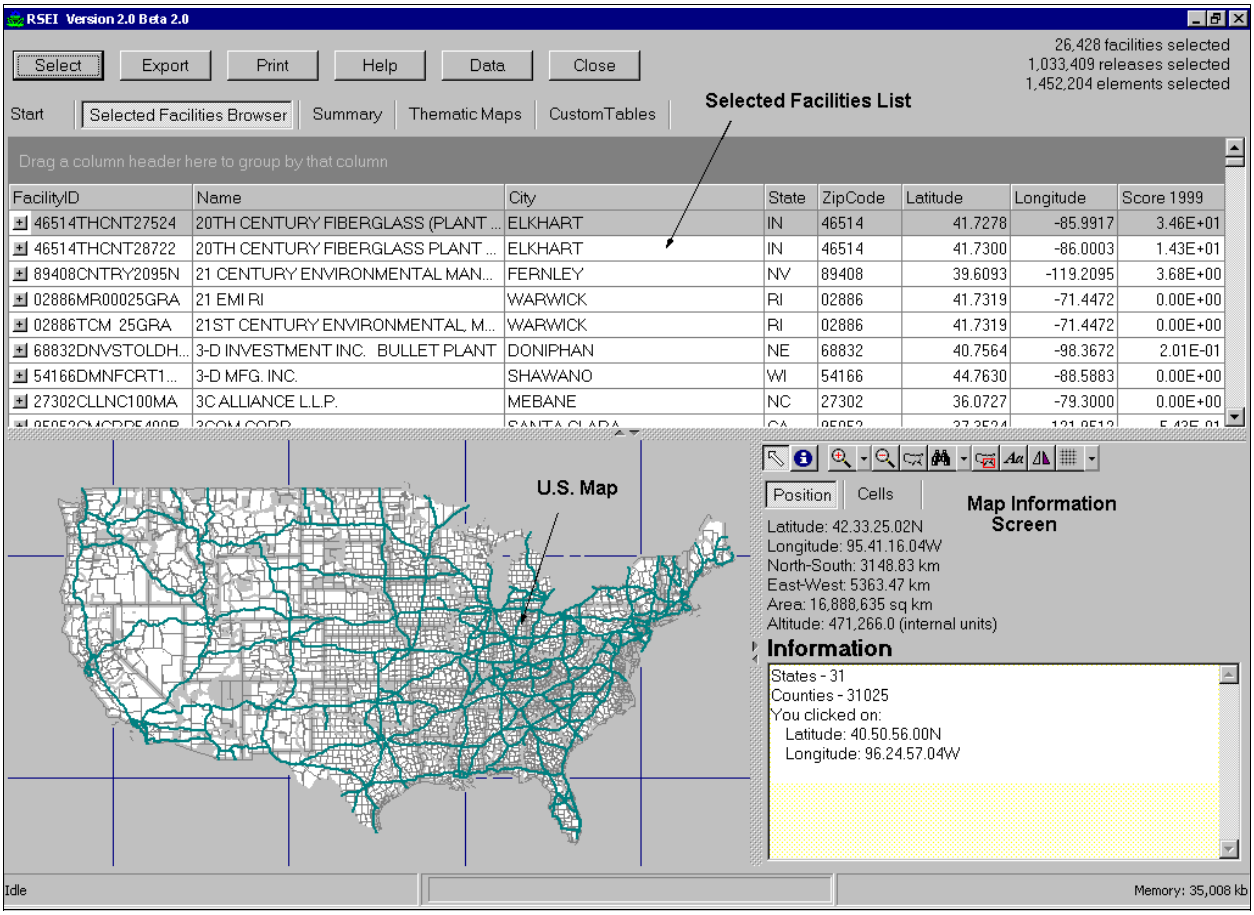
CHAPTER 6
Displaying Selected Facilities– The Selected Facilities Browser

Once you have selected the records you would like to analyze using the **Select** button, you can view your data in a variety of ways. To see a list of the facilities in the selected dataset and their locations on a map, choose **Selected Facilities Browser** from the second row of options at the top of the screen. You will see a screen with three parts. The top part of the screen is the list of the facilities selected in your selection. You can group and sort this list, and expand it to look at specific chemical releases for each facility. The bottom left part of the screen is the U.S. map. Here you can map your selected facilities, as well as show the surrounding populations and the concentrations of air releases. The map information screen at the bottom right provides the buttons which navigate and customize the map, and displays information about the map's current display. You can resize each of the sections of the screen by clicking and dragging on the arrows separating each section of the screen. The following sections describe each part of the screen, and how they function together to allow you to see the information you need in the most helpful way.

When you open the Selected Facilities Browser, it may take a few minutes to update the display with the set of selected facilities. Even if your set has not changed, if you open another screen, then go back to the Selected Facilities Browser, the model will refresh the screen again, which will take a few minutes to complete. The status bar at the bottom left of your screen will inform you of what the model is doing.

The Selected Facilities List

The list at the top of the screen shows all the facilities that have at least one release in the selected set. For each facility, the list shows its TRI facility ID number, the facility name, the city, state and ZIP code of the facility, its latitude and longitude, and the total score for the facility in 1999. The default sort order of the list is by TRI Facility ID. However, by clicking on the header for any column, you can sort the list by that column's variable. A grayed-out arrow will appear in the right-hand corner of the header to show you that the list is sorted by that column. Note that if a facility is highlighted before sorting, it will remain in the display afterward. If you want to see the beginning of your list, use the arrow buttons to scroll up to the beginning.



The Selected Facilities Browser

The list works like a directory tree (such as in Windows Explorer) that you can expand or collapse by double-clicking on rows (or by clicking on the plus or minus sign at the far left of a highlighted row). If you double-click on a facility in the list, you will see two entries below that facility: 'Submissions' and 'Full Facility Record.' Double-click on the 'Full Facility Record' to get a complete listing of all the information contained in the model about that particular facility.

To open up a level in the Selected Facilities List, either double-click on the desired entry, or click on the entry once to highlight it, then click on the plus sign at the far left of the row. Clicking on a plus sign will not work if the entry is not highlighted first.

If you double-click on 'Submissions,' you will get a full listing of all of the facility's TRI submissions. Those submissions that are included in your selected set will be highlighted in green. The default sort order for these releases is by DCN (the Document Control Number assigned by TRI), but, like the facility list, you can double-click on any column's header to sort by that column. For each submission, this list displays DCN, the year of the submission, the chemical name, its use and Max Onsite codes (see Chapter 9 for explanations of codes), the total pounds released, and the inhalation and oral toxicity weight for the chemical. If you double-click on a submission that has a nonzero entry for 'Total Pounds,' an entry titled 'Releases' will appear. Double-click on that entry, and 'Media Text' will appear. Double-click on any of the 'Media Text' entries that appears, and the screen will display an entry called 'Scores.' Double-click on that, and the 'Scores' screen will display the total pounds, total score, population affected and the score category text. If the score is zero, the score category text will inform you of the reason the release could not be modeled.

Submissions are chemical-specific, but can include releases to more than one medium. **Releases** are specific to one medium.

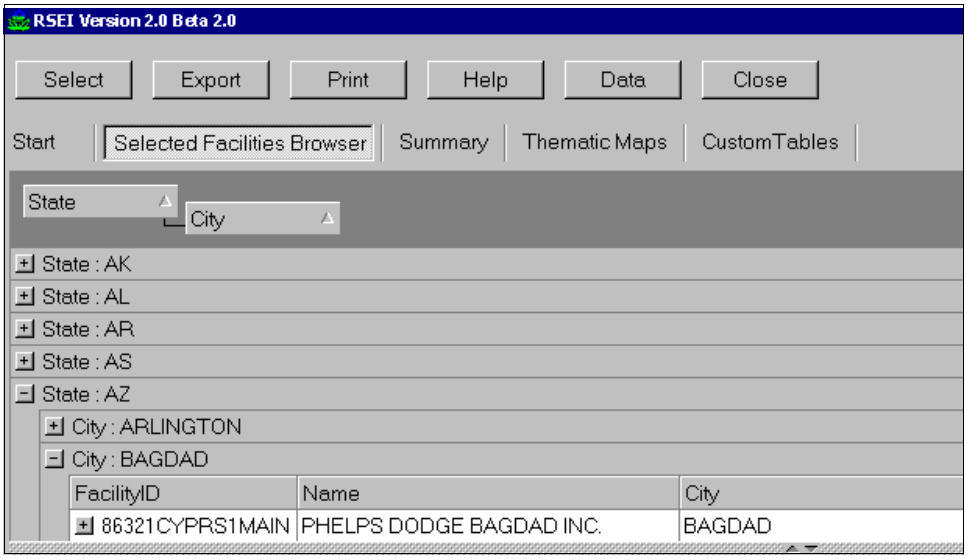
To return to a previous level, simply click on the minus sign to the left of each entry, and the entry will be hidden. Either double-click on the entry, or click on the plus sign to show it again.

If you find a certain facility that you would like more information on and you wish to make a new selection including that specific facility, you can copy the TRI ID in order to paste it into the selection statement. Simply highlight the row in the Selected Facilities List containing the desired TRI ID, and right-click on it. Nothing will noticeably change in the display. But you can then press Control-C, which will copy the TRI ID to the Windows clipboard. You can then paste the TRI ID anywhere, including the **Select Elements...** screen, or even other programs like Excel, Wordperfect, etc.

Changing the Grouping

The default organization is to list facilities singly. However, if you want to group them, for instance by state, you can. Just click on the column header that you want to group by, such as 'State,' and drag it up to the darker gray bar at the top of the screen and drop it there. Then the list will show an entry for each state in your selection. If you double-click on a state, the list will expand to show all the facilities in that state. The rest of the list works as described above.

You can also group on more than one column variable. For instance, you may want to group first on state, then on city. Click and drag 'State' first, then 'City' and the model will show them linked in the gray bar at the top of the screen. The collapsed list will show all states in your selection. If you click on a state, a list of all cities in that state in your selection will be displayed. Then if you click on a city, a list of all the facilities in that state will be displayed.



List of Selected Facilities, Grouped by State and City

To return to the default grouping, simply click and drag the column headers from the gray bar at the top of the screen back to their original position.

Using Map Functions

The map is shown in the bottom left of the 'Selected Facilities Browser.' The buttons you can use to navigate and modify the map are in the bottom right. The **Map** works with the list of selected facilities at the top of the screen- the facility that is highlighted in that list will determine what some of the map features display. However, some of the map features work from the entire selected set. All TRI reporting facilities are shown as purple

TRI Reporting facilities are those facilities required by law to report their emissions to TRI. **Offsite facilities** (or Receiving facilities) are facilities, like landfills or POTWs that do not directly report, but receive waste from TRI reporting facilities. The reporting facilities provide details about the disposal methods used by the offsite facilities.

triangles on the map. As described below, you can select an option to make facilities in your selected set appear larger and darker purple. Offsite facilities are shown as pale yellow triangles.

Finding a Location (Position) 

The default view of the map is the continental U.S. view. Alaska and Hawaii are not shown in the initial map but are available in other views (see below for details). The information to the right of the **Map View** screen describes the current map. You can click on any part of the map with the mouse.

When the **Position** button is highlighted the following information is displayed:

- **Latitude** and **Longitude** refer to the last point where the cursor was placed on the map (latitude and longitude will change as the cursor is moved);
- **North-South** and **East-West** express the kilometers that can be viewed along each axis in the current map;
- **Area** shows the square kilometers shown on the current map, and
- **Altitude** reflects the zoom level of the current map, and is approximately the kilometers that can be viewed in the width of the screen;
- **Information** shows, in the bottom right-hand window, a list of geographic and demographic facts about an area on the map that you click on. Facts include the FIPS code of the state and county, and the name of the facility if a triangle was clicked on.

Changing the Zoom 

To zoom in, either click the zoom-in icon, or draw a box with the cursor around the area you want to zoom in on, while holding down the right mouse button.

Three zoom icons are available for selecting a position on the map. The **Zoom-in** icon  will zoom in on the center of the current map. The **Zoom-in** icon also allows the user to select a specific state by clicking on the arrow to the right of the icon and then the desired state. The **Zoom-out** icon  zooms out from the current map. Click on the **US map** icon  to zoom back to the full continental US view. You can also zoom into a particular area by drawing the diagonal of a square with the cursor while holding down the right mouse button.

You can move the map by left-clicking on the map and dragging the cursor in the direction that you want the map to move. There will be a slight time delay as the map adjusts itself. In this way you can move the map to view Alaska, Hawaii and the territories.

Retrieving Information 

To retrieve geographic information about a point on the map, click the **Identify** icon then click on any point on the map. In the **Information** box geographic and demographic data for the selected point will be displayed. Displayed data include locational information like latitude and longitude, state, county, and nearby geographic features; population data from the U.S. Census Bureau (at the grid-cell level); and data on nearby TRI reporting facilities. (See the tables of variable descriptions in Chapter 6 for an explanation of the information displayed here.)

Highlighting Selected Facilities 

When you open the Selected Facilities Browser, the map will only show the facilities in your selected set. Onsite facilities will be shown as dark purple circles. Offsite facilities will be shown as yellow squares. If you click on the 'Toggle highlight of selected facilities,' the remaining facilities not in your selected set will also be shown. Nonselected onsite facilities will be shown as light purple circles. Nonselected offsite facilities will be shown as white squares.

Showing Facility Names 

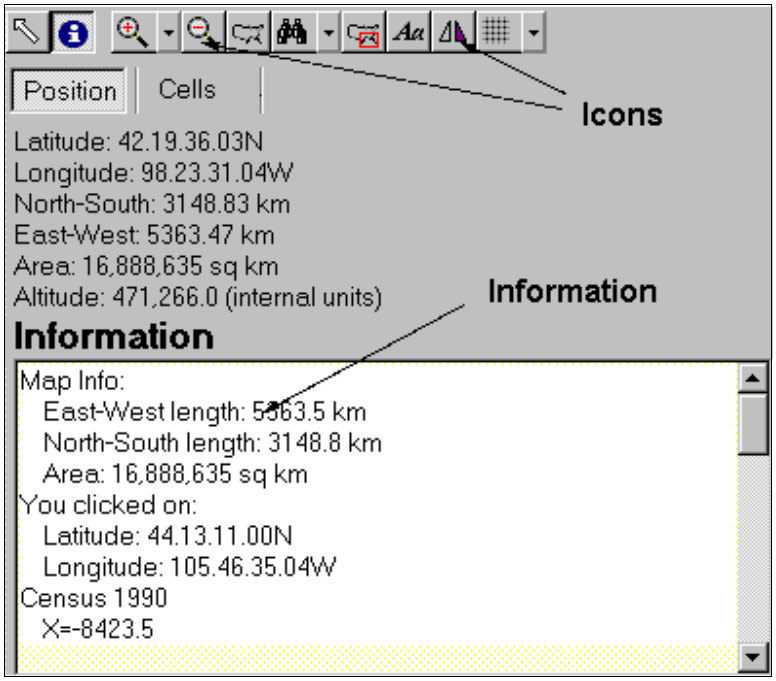
Click on the 'Show/Hide Facility Names' icon to display the names of all facilities (not just those in your selected set). If your map is zoomed out too far, the names will appear printed over each other and will be illegible. This function is only useful when you are zoomed in to a handful of facilities. If you want to perform a selection on the facilities you currently see displayed, see the next section below. To remove the facility names, simply click on the button again.

Selecting a New Set of Facilities by Geographic Location 

Clicking on the 'Select all facilities in current view' icon will select all of the TRI facilities that are currently showing on the map screen. The model will ask if you would like to add more conditions to your selection; if you would like to limit the selection by other variables such as year, or chemical, click 'Yes.' The **Select elements...** screen will

appear where you can modify the selection as desired (the first two statements added by the model are based on latitude and longitude) and select the displayed facilities. Otherwise click 'No.' When the set of selected facilities is displayed in the 'Selected Facilities Browser,' the map as you modified it before your selection will still be displayed, so you can simultaneously see your facilities on the map and then the facilities and their associated releases and scores in the window above.

Displaying Facility Information



Some of the features on the **Map** screen work in conjunction with the list of selected facilities shown at the top of the screen. The sections below first describe the icons at the top of the right-hand screen, then the **Cells** button, which displays cell-specific population and concentration data.

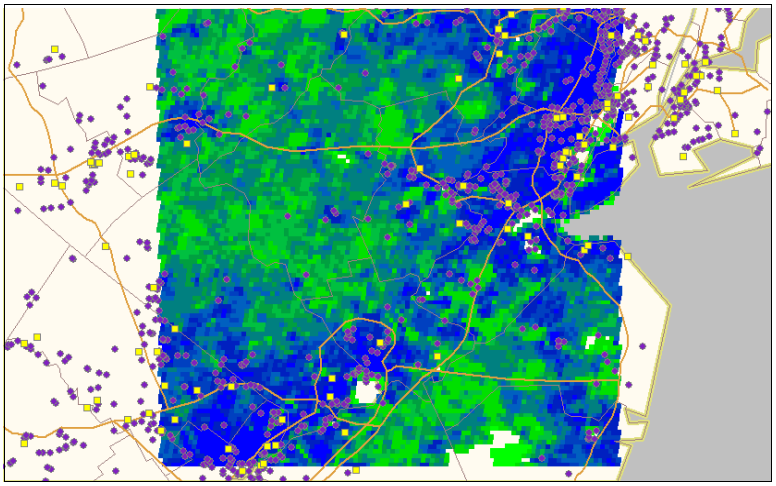
Locating the Selected Facility 

First click on a facility in the selected facilities list at the top of the screen, so it is highlighted. You can also highlight a particular submission or full facility record for a facility. Then click on the binoculars icon. The model will zoom in using concentric circles to show you where the facility is located. If you like, you can then click the zoom in icon to zoom in to more detail. Additional information about a facility can be displayed by clicking on the small arrow to the right of the binoculars icon. A drop down menu with four buttons will appear. 'Stream Path' shows the modeled receiving stream. If there are no water releases, the model will alert you that, 'Facility has no receiving stream defined.' If you click on the 'Receiving facility' option, the model will show you where the offsite facility (if any) that receives waste from your highlighted selection is located. However, because a facility can send waste to more than one receiving facility, you must first highlight a specific release. If you do not, the model will prompt you to select one. If there is an offsite

facility, you can also click on 'Stream Path for Receiving Facility' to see the nearest stream to that offsite facility. To clear either stream path, click 'clear reach path.'

Displaying Populations and Chemical Concentrations 

The last button in the row of icons also works in conjunction with the list of selected facilities at the top of the screen. Using this button, you can display the population density and the concentration of air releases for a 50-km square around facilities in the selected set. Select a facility in the selected facilities list at the top of the screen, so it is highlighted. You can also highlight a particular submission or full facility record for a facility. Then click on the grid icon. The map will show a grid around your selected facility with gradations in color indicating different population densities. If you click on a transfer to an offsite facility in the facilities list, you can click on the arrow to the right of the grid icon, and then click on 'Population around receiving facility' in the drop-down menu. This will create the same kind of grid, but with the offsite facility at the center. Note that the first option in the drop-down menu, 'Population,' is the same as clicking on the grid icon itself.

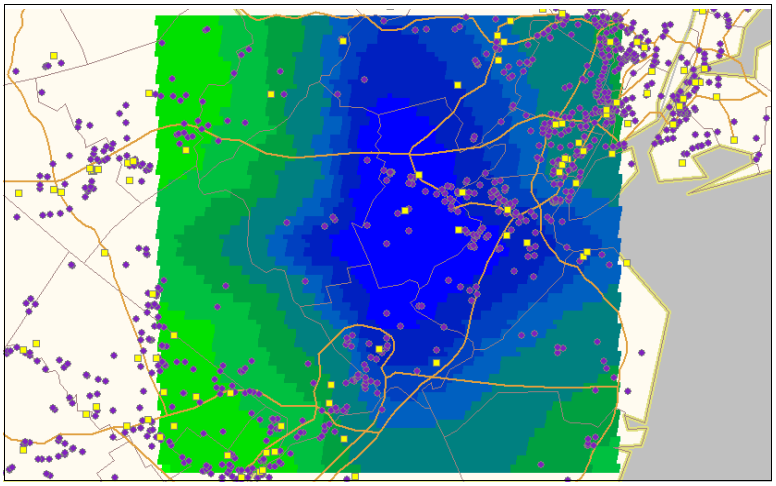


To model concentrations of fugitive and stack air releases around your selected facility, you must first select the release to be modeled. First double click on your selected facility, and then double click on 'Submissions.' This will display all of the chemicals released for your selected facility for all years. The chemical releases that are included in your selected set are highlighted in green. Double-click on the chemical you would like to see the concentration for, click on 'Releases,' and then select a stack or fugitive air release.

You can select any air release shown on the Selected Facilities List, whether it is highlighted green or not.

Next, click on the 'Concentration' option in the drop-down menu from the grid button. This will model the air concentrations of the chemical release for all of the grid cells that have nonzero values. The RSEI model only calculates concentrations out to 50 km, so that is the maximum size of the plume that will be displayed. The window to the right of the map will display the facility name, the year of the release, and the total pounds of the release(s) being modeled.

The window will also display the range, mean, sum and standard deviation of the cell concentrations in black. Note that the colors used in the map are the ones selected through the **Change Theme** button explained below. The default is green to blue, but you can customize it to any color you would like. The number and type of class breaks, however, is fixed and cannot be changed.



You can also model population-weighted concentrations for your selected release by clicking on the 'Pop Weighted Conc' option in the drop-down menu. This is equivalent to Pop*Conc– it does not include toxicity calculations. Note that this option is concentration multiplied by total population; subpopulation information is not available in this option.

You can model subpopulations using the **Cells** button, as described below. To clear the mapped cells, click the **Change Theme** button, and select 'None' in the box next to 'Value.' Click **OK** and the map will clear.

When graphing population or concentrations, you can click on the 'Show feature outline' option to see the outlines of the grid cells.

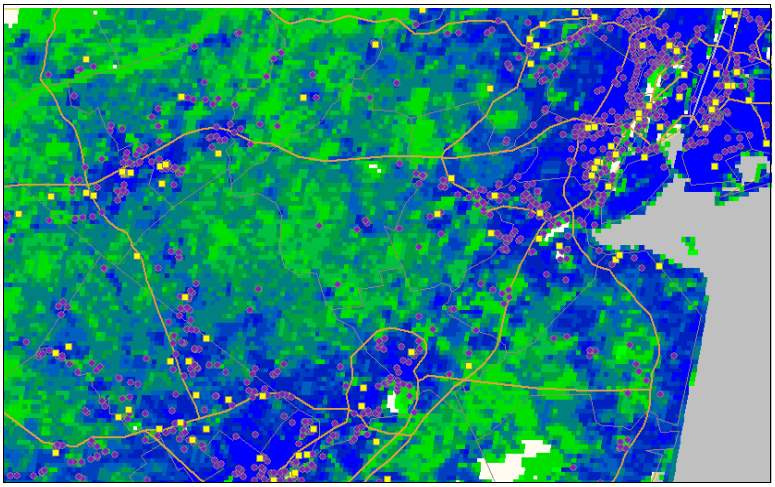
Cells Button

The RSEI model contains detailed demographic data at the cell level (a 1-km by 1-km grid cell is the unit of analysis used in the model). In the **Cells** screen, you can graphically display demographic data and aggregate air release concentrations. You can even create and display custom variables based on the data in the model using the **Change Theme** button. A variable's range of values will be displayed on

the map in graduated color, allowing you to see differences in population density or level of chemical concentration.

To select a new **Theme** click the **Change Themes** button. If you are not zoomed in on a small enough area, the model will give you a message. Either click the zoom in button to zoom in on the center of your currently displayed map, or draw a box with the cursor while holding down the right mouse button to zoom in on that area. The **Select Theme...** screen will appear. In the 'Type' box, you can select either 'Population' or 'Concentration.'

There are important differences to note between the grid icon function and the **Cells** button. First, the grid icon graphs the population or air release concentration around the facility whose release is highlighted in the Selected Facilities List, while the Cells button graphs whatever area is showing on the map when the **Cells** button is clicked. Second, when graphing air concentrations, the grid icon function graphs only the air release selected in the Selected Facilities List. The **Cells** button graphs the sum of all of the air releases in the selected set (only those releases highlighted in green in the Selected Facilities List) that impact the area shown on the map.



If you select 'Population,' you can then graph gradations in total population or various population subgroups by selecting the appropriate entry in the 'Value' field. If you select a subgroup, you can then graph that subgroup as a percentage of the total population in each cell by clicking on the box below the 'Value' field. If you leave that box unchecked, the total number of people will be graphed. You can also select the year of the demographic data; the default is 1999.

If you select 'Concentration' in the 'Type' field, then in the 'Value' field you can select how the releases are displayed. 'Overlapping plume count' is a count of the number of releases (plumes) that are impacting each cell shown in the current display. Note that this is a count of releases, not the concentrations resulting from these overlapping releases. 'Tox weighted conc,' is the chemical concentration times the chemical's toxicity weight. The Tox*Pop*Conc subpopulation variables show the product of the chemical's concentration, its toxicity weight, and the specified subpopulation in each cell.

The model will only graph the concentrations that are included in your set of selected releases. For instance, if you selected all releases in Georgia in 1999, and then try to graph concentrations in New York, the model will not create a graph. Similarly, you must select a year that is included in your set.

You can accept the default class breaks, or you can select how you want the data gradations displayed by breaking the range of possible values into classes. In the 'Number of Classes' box, select how many classes you want your data broken down into. The higher number of classes you select, the more detailed gradations in color you will see on the map. However, if your data has a small range and you select a high number of classes, you may end up with several classes that start and end with the same value (depending on what kind of class break you select, see below). It may be necessary to try several different combinations of class number and class break type to create the desired graph.

'Class Break Type' determines the method used by the model to break the variable's range into classes. The following options are available:

- **Range.** This method takes the range of the values, and, using the number of class breaks you selected, splits the range so that all intervals are of equal size.
- **Percentile.** This method takes the range of the values, and, using the number of class breaks you selected, splits the range into intervals so that the number of cells falling into each interval is equal.
- **Standard Deviation.** This method shows you how much a cell's value differs from the mean. The model finds the mean of all cells, then, using the number of class breaks you selected, sets the intervals at either one or some fraction of a standard deviation until all the data are included in a class.

The three buttons at the bottom of the **Select Theme** screen determine the colors used in the map display. The model automatically displays gradations of color between the 'Start' color and the 'End' color. The default color scheme is blue to green; however, you can change the two colors as desired.

After all of the options are selected, click OK, and the model will graphically display the variable on the map. Note that graphing air concentrations can take a considerable amount of time (up to ten minutes) because the model actually runs the air modeling program each time. To the right of the map, the model will display the current theme and the range, mean, sum, and standard deviation of the variable you selected for the geographic area shown on the map. The units for graphing population are the number of people per 1 km^2 grid cell. The units for concentration are $\mu g/m^3$.

In the box under those statistics, the model will show the class breaks, and the colors used to display them on the map. To select the members of any particular class, simply click on that line in the box, and all of members of that class will be highlighted in yellow on the map. You can only highlight one class at a time - the model will deselect the previously highlighted class if another one is clicked on in the window.

If you wish to change any of the options you have chosen, simply click on the 'Change Themes' button again and modify the desired options.

To clear any graphing from the map (whether graphed using the grid icon or the **Cells** button), you can click on the **Cells** button, then click on the **Change Themes** button. Select 'None' from 'Value' dialog box. The map will clear all graphed values.

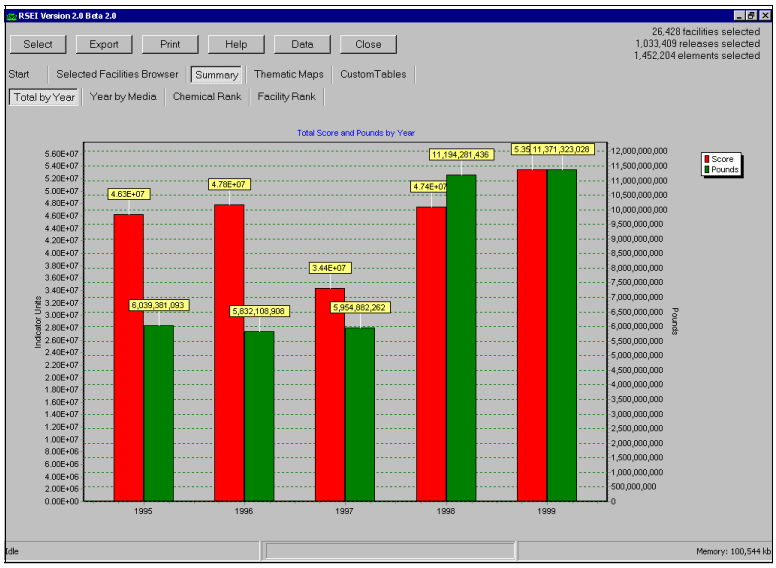
CHAPTER 7
Snapshots of Selected Releases– Summary and Thematic Maps

The **Summary** and **Thematic Maps** buttons, found in the second row of menu buttons, provide quick standard ways to look at the set of releases you selected using the **Select** button. The **Summary** button lets you quickly see graphs of total score and pounds by year, and year by media, as well as ranked lists of chemicals released and facilities. These options are frequently requested analyses, but may not be exactly what you want. More customized functions can be found under the **Custom Tables** button, as explained in Chapter 8.

The Summary Button

There are four options under the **Summary** button. Each is explained below.

Total by Year

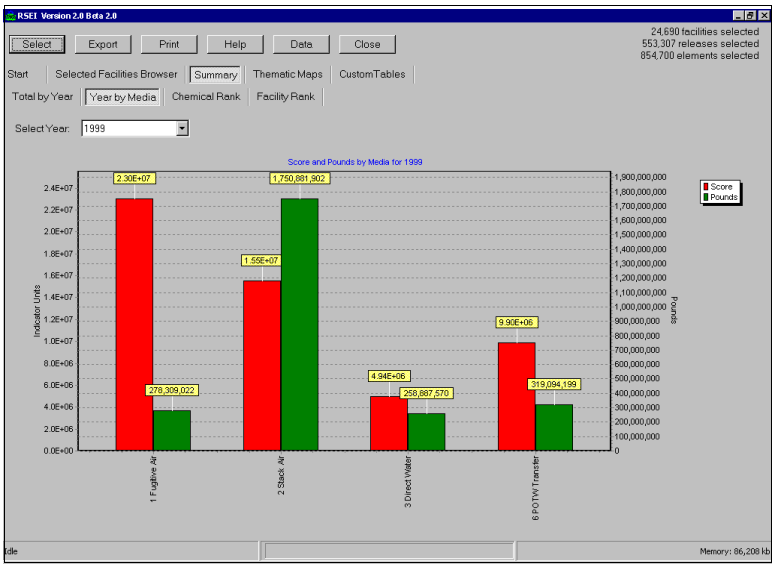


Total By Year Summary Graph

This button brings up a preformatted graph that shows the combined score and pounds for all releases in the selected set. There are two bars for each year in your selection. The red bar on the left displays the total score for the year indicated underneath the bars. The total score is shown in a yellow box above the bar, and is measured using the scale on the left side of the graph. The green bar on the right displays total pounds for the year indicated. The total score is shown in a yellow box above the bar, and is measured using the scale on the right side of the graph. If your selection only includes one year, the graph will only show the two bars.

Year by Media

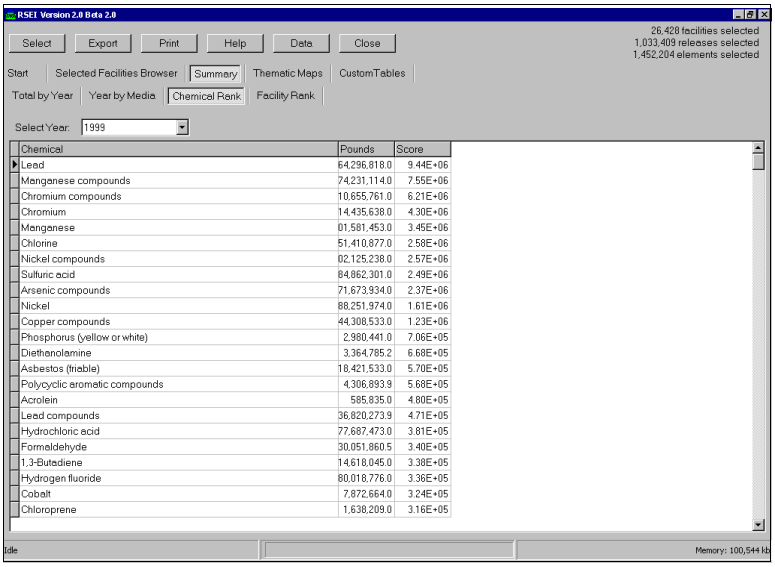
This button uses the same color scheme and scales as **Total by Year**. But in this case the horizontal axis shows media instead of year. The graph only shows one year at a time, which can be changed in the 'Select Year' box located above the graph.



Year by Media Summary Graph

Chemical Rank

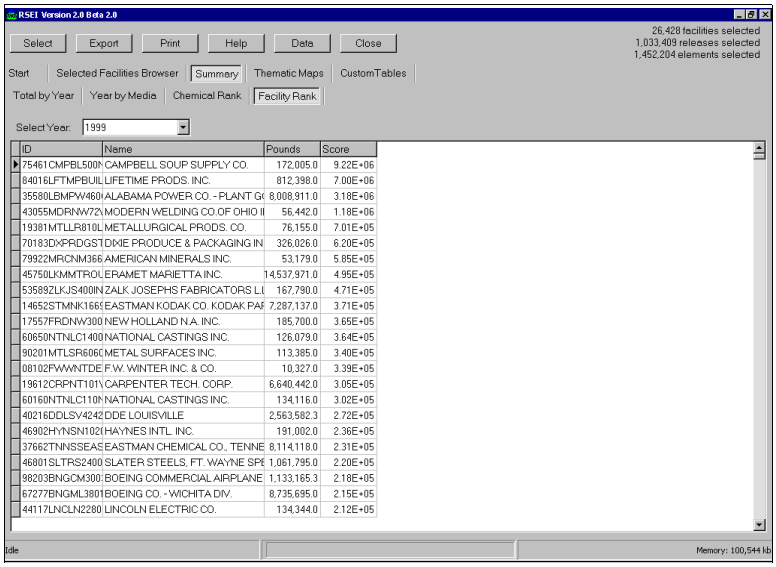
This button shows all the chemicals in the set of selected releases, ranked in order of highest score first. It only shows one year at a time, which can be changed in the 'Select Year' box at the top of the screen.



Chemical Rank Summary Table

Facility Rank

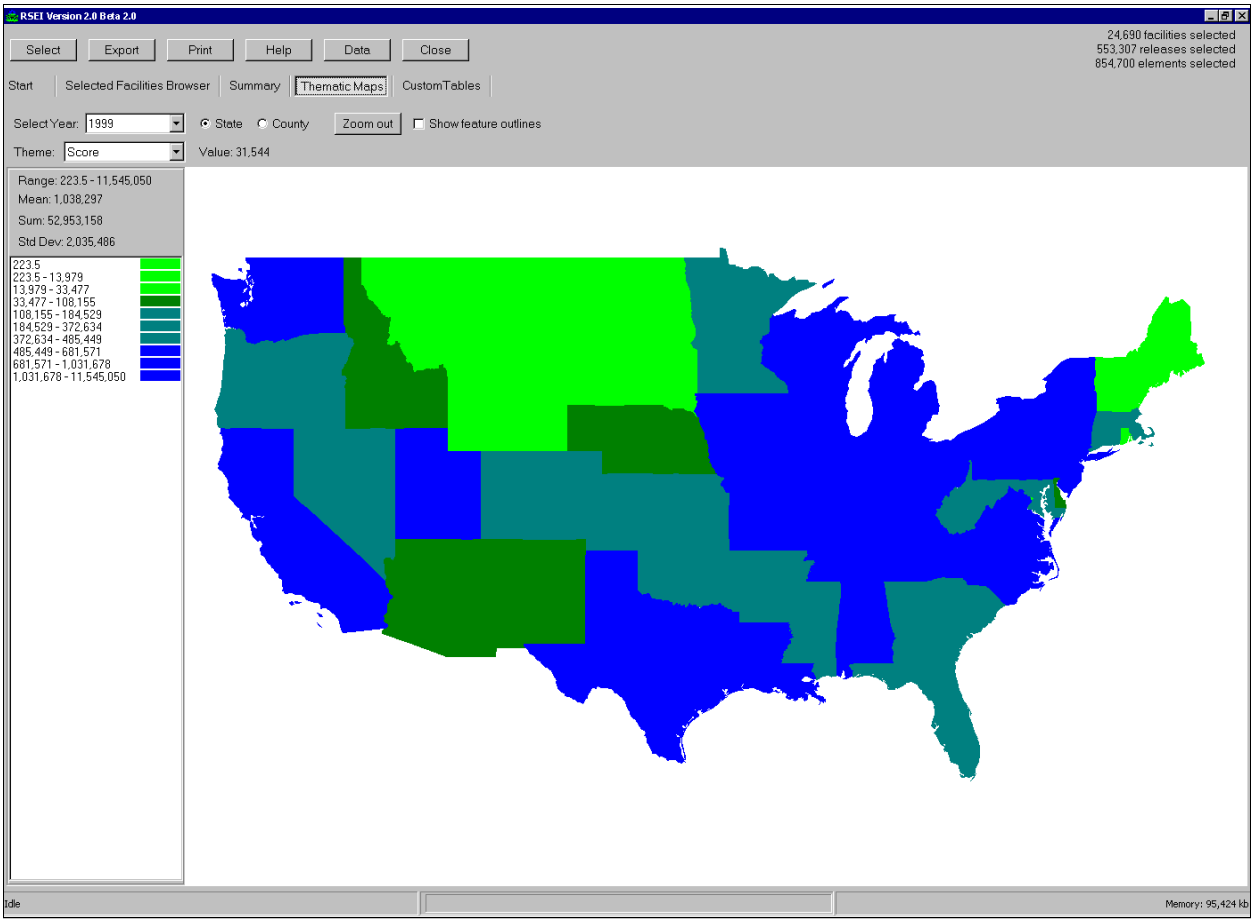
This button shows all the facilities in the set of selected releases, ranked in order of highest score first. It only shows one year at a time, which can be changed in the 'Select Year' box at the top of the screen.



Facility Rank Chemical Table

The Thematic Maps Button

This button allows you to quickly see geographic differences for different themes. At the top of the screen, you can select the year that you want to map, whether you would like to do it at the state or county level, and the theme you would like to display. You can display the total score for each county or state for that year, the score for population subgroups, the total pounds released for each county or state, or the total number of releases, facilities or chemicals for each county or state. When you select a theme, the model will automatically display it on the map. You can zoom in to a specific area by drawing a box with the cursor while holding down the right mouse button. You can zoom back out using the button above the map. You can pan the map to see Alaska, Hawaii, or the territories by clicking and dragging the map. The legend in the window on the lower left shows the range of values and their corresponding colors. The text above it displays the range, mean, sum, and standard deviation for the national distribution. Adjacent to the theme selection, you can see the value for your selected theme wherever



Thematic Map, Showing States

you currently have the cursor placed. If you click on the 'Show feature outlines' option, the map will display the state or county boundaries in black, to clearly outline states and counties.

The model may take a few minutes to load the Thematic Map. The map will use whatever color scheme you have selected in the **Change Theme** dialog box. The number and type of class breaks is fixed and cannot be changed.

CHAPTER 8
Analyzing Selected Releases – Custom Tables

The **Custom Tables** button allows for the display of information in many different ways. Like the **Selected Facilities Browser**, custom tables work from the dataset selected using the **Select** button.

You can construct a table using any variables in the model (including variables that were not used in your selection), change the rows and columns, examine different statistics, sort the data, and cut the data in many different ways.

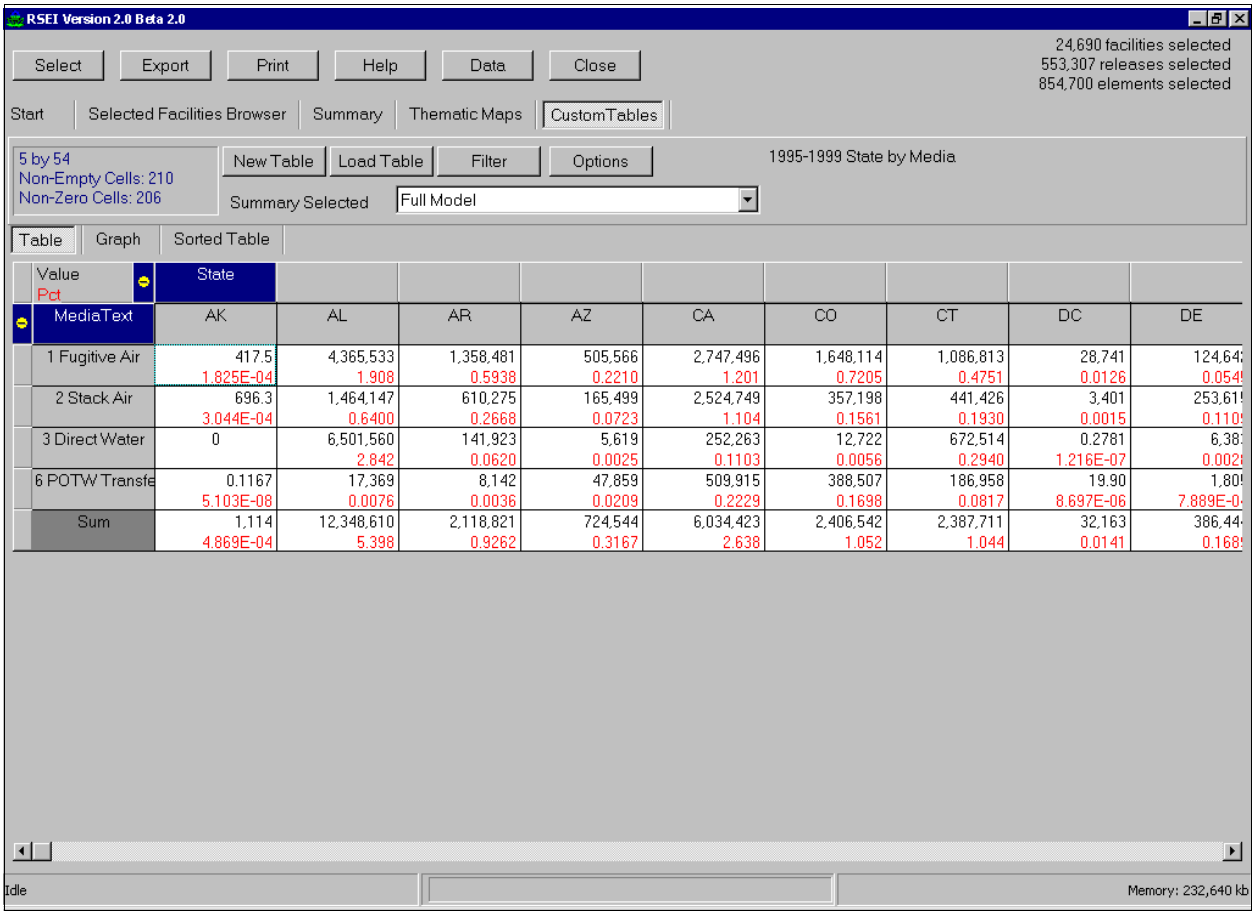
Creating a New Table

Click **New Table** to create a new table based on your selected data. This will bring up the **Select Dimensions** dialog. Here you can select the variables that will be displayed in your new table. The variable names are in the format Category.Variable. There are five categories: Chemical, Facility, Submission, Release, and Element. Each variable is associated with a category. For instance, Chemical.CAS Number refers to the CAS number variable, which is in the 'Chemical' category. Check the boxes next to the variable name to include the variable in your crosstab table. There is no firm upper limit on how many variables you can select. It depends on how many values each variable can show, and how much data will be displayed on the screen. If your table is too large or too complicated to be displayed you will see a 'list index out of bounds' error, and the model will not display the table. However, the table is often completed, and can be found in the C:\Program Files\RSEI\User directory, as a Paradox table with .db extension.

Enter a name for your table in the box at the bottom of the screen. Note that file names cannot include any of the following characters: forward slash (/), backslash (\), greater-than sign (>), less-than sign (<), asterisk (*), question mark (?), quotation mark ("), pipe symbol (|), colon (:), or semicolon (;). If you attempt to enter any of these characters, the model will not accept it. If this is not your first table, the name must be different than the previous table; the model will not overwrite what is currently showing. The table will be saved to the C:\Program Files\RSEI\User directory as a Paradox table with a .db extension.

The model will make the first variable selected the column variable, and the rest will be row variables; however, you can change the order once the table is displayed (see Modifying the Table, below). Hit **Run!**, and the table will be displayed in the window. Depending on how big your selected dataset is and how complicated the table you requested is, it may take anywhere from 30 seconds to 30 minutes to display the table.

The new table is saved so that it can be loaded for future use. You can click the **New Table** button again to make a different table (using the same set of selected facilities). The row and column options you selected previously will still be checked, so be sure to deselect them if you do not want them included in your next table. The name of the table currently showing appears to the right of the third row of menu buttons.



Custom Crosstab Table

Note that when your new table is displayed, it may show only one row variable and one column variable. Any additional row and column variables that you have selected may be hidden. Click on the small yellow plus sign on the right side of the row variable to show the additional variables. The table is fully expanded when the last row or column does not show a small yellow plus sign on its right edge. It will be faster to re-display your table if leave row and column variables hidden when not viewing them. The values in black in the table represent the value as shown in the 'Summary Selected' box. For

instance, if the box displays 'Full Model,' the value in black in each cell is the risk-related score. The value in red beneath it is the Total Percent, that is, the percent of the total value of the table for that summary that is contributed by that cell. You can remove the Total Percent display or add additional percentage displays by using the **Options** button. See below for details.

Loading a Table

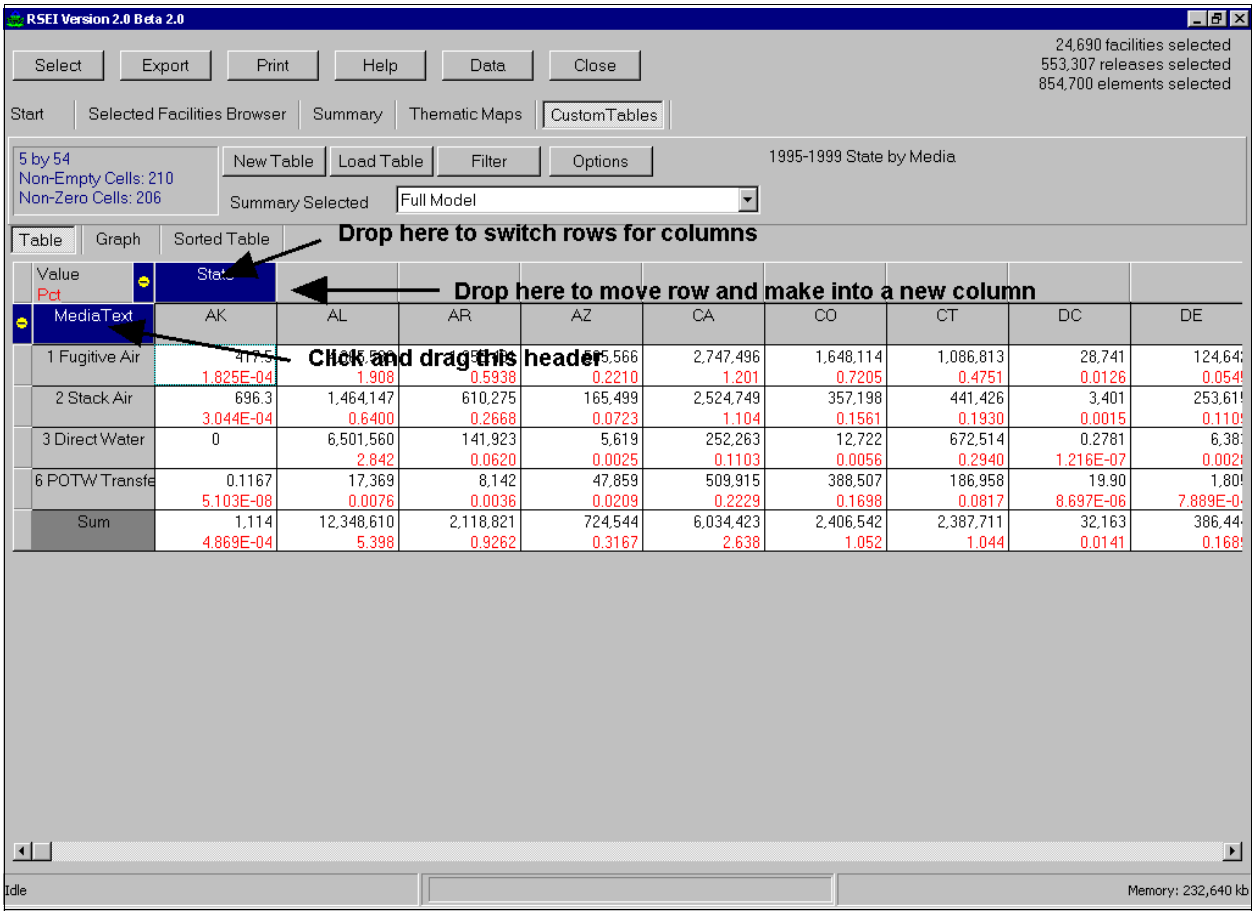
Every new table that you create and name is saved to your hard drive, in the C:\Program Files\RSEI\User directory. To load any table you have previously created, simply click on the **Load Table** button, and select the desired table. Note that loading a table will only change the data in the Custom Table functions (**New Table**, **Graph** and **Sorted Table** functions). The last underlying set that you selected using the **Select** button will still be the active set for all the other functions. To see the set that was used in the generation of the table that is presently loaded, click on the table name, and you will see a window with the selection statements used for that set. Remember if you want to see the selection being used for all of the other functions, you can click on the text displaying the number of selected facilities, releases, and elements in the upper right corner of your screen, to see the selection statements for that set.

Once you have loaded the table, you can modify it as you would any new table you create.

Modifying the Table View

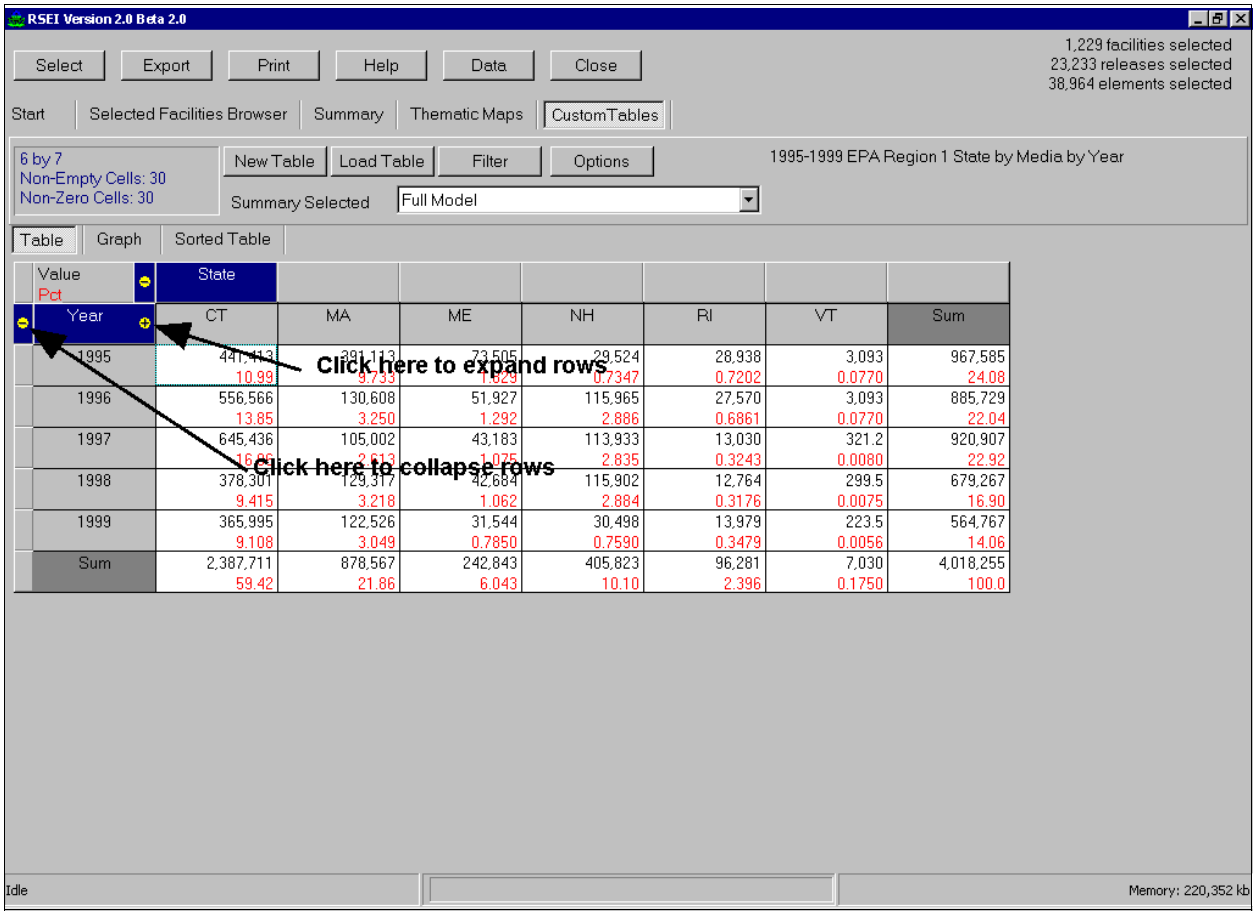
To switch the rows and columns, simply click and drag one row or column heading over the heading of the row or column heading you would like to switch with it. Hold down the mouse button until a double arrow sign appears over the heading . Then release the mouse button and drop the heading. To move columns or rows, click on the heading of the row or column you want to move, and drag it next to the row or column heading where you would like to add it, until you see two arrows pointing at each other. Then release the mouse button. Note that you can only move variables that are open and showing. However, it will increase the speed of moving rows and columns if you collapse any variables that are not being moved.

To **switch** a row variable with a column variable (or vice versa) click and drag the heading of one variable and drop it on top of the other heading. To **move** one variable, click and drag the heading and drop it next to another heading.



To collapse rows or columns, click on the yellow circle with a minus sign immediately to the left of the row you want to collapse, or immediately above the column you want to collapse. Clicking on a minus sign collapses every row or column after it (i.e., closer to the middle of the table). If, for instance, you have three row variables, and you click on the leftmost minus sign (to the left of the first variable name), you will collapse all of the rows, and table will show only the totals for each column variable. If you click on the minus sign to the right of the first row variable name, you will collapse the second and third row variables.

When a row or column is hidden, the minus sign will change to a plus sign; click on the plus sign to restore the row or column. If a following row or column was collapsed when the preceding row or column was collapsed, the following column will remain that way when the preceding one is restored. Click on the following row or column's plus sign to restore that one as well.



Any column can be resized by using the mouse to move to the right-hand border of the heading of the column you wish to size, until the arrow becomes a double line with two arrows. You can then move the mouse to the right to make the column wider or move the mouse to the left to make the column narrower. The row heights can be resized in a similar way. The row widths cannot be resized.

Using the Filter

In addition to collapsing rows and columns, you can also control how your data is displayed by using the **Filter** option. The **Filter** option allows you to select specific values for the variables in your table. Once filtered, only the selected values will be

displayed, allowing you to focus on specific entries. For instance, if you create a table with state and media text as variables, you can set the filter to show only states in EPA Region 1.

Click on the **Filter** button at the top of the 'Tables' screen. This brings up the **Set Filter** dialog. In the first window, select the variable you would like to filter by clicking on its name. This will bring up a list of values in your table from which you can select filter parameters. Click on the box next to any of the values that you would like to see displayed in the table, then click **Apply Filters**. The Crosstab table will be shown, using only the values you selected for the variables you modified. To remove the filter, click **Filter** again, then click **Clear this filter**, then **Apply Filters**. Filters for multiple variables can be selected, at the same time, or in succession. Simply click on each variable in the **Set Filter** dialog, and then select the values you are interested in. You can clear one filter by highlighting the variable in the top window, then clicking **Clear this filter**. Clear all filters by simply clicking **Clear all filters**.

The filters in effect at any time are shown at the bottom of the **Set Filter** dialog.

Summary Selected

In this window you can select how you want to express the data in your table. You can display the raw data (TRI Pounds), show the number of pounds that can be modeled (Modeled Pounds) or express the Indicators as measures which incorporate hazard (toxicity), toxicity and population, or risk (toxicity, exposure, and population). Each option gives a different perspective on the reported releases and transfers. Descriptions of these selections are:

- **Count of Elements.** This number reflects the total number of individual Indicator Elements.
- **Count of Releases.** This number reflects the total number of individual releases. The number of releases for some media is slightly less than the number of elements, because some releases (such as those to surface water) end up partitioned between two or more pathways (fish ingestion and drinking water in the case of surface water).
- **Count of Facilities.** This is the total number of facilities.
- **TRI Pounds.** This number reflects the number of pounds released or transferred that are reported to the Toxics Release Inventory for the exposure pathway being considered.

- **TRI Pounds (with toxicity).** This value shows only TRI pounds for the chemicals that have toxicity weights. This value differs from Modeled Pounds because it includes those chemicals which have toxicity weights regardless of whether they have physicochemical properties.
- **TRI Pounds (with toxicity)*Tox (Hazard Based).** This value is TRI pounds multiplied by the toxicity weight of the chemical appropriate for the exposure pathway selected. For releases to media which have both oral and inhalation exposure pathways, the higher toxicity weight is applied to all the TRI pounds.
- **Modeled Pounds.** This number reflects the number of pounds released or transferred (TRI Pounds) that can be modeled. Reasons that releases may not be able to be modeled include lack of physicochemical information required for exposure modeling or lack of toxicity weights.
- **Modeled Pounds*Toxicity.** This value is *modeled* pounds multiplied by the toxicity weight of the chemical appropriate for the exposure pathway selected. It does not measure how the pollutant moves through the environment and comes in contact with an individual. The oral toxicity weight is used for releases or transfers to all media except 1 (fugitive air), 2 (stack air), 750 (offsite incineration), and 754 (offsite incineration- no fuel value) (see Table 9-2).
- **Modeled Pounds*Toxicity*Pop.** This value is the number of *modeled* pounds multiplied by the toxicity weight of the chemical appropriate for the exposure pathway selected and by the population potentially exposed. The oral toxicity weight is used for releases or transfers to all media except 1 (fugitive air), 2 (stack air), 750 (offsite incineration), and 754 (offsite incineration- no fuel value) (see Table 9-2).
- **Full Model Children Under 10 (Risk-Related).** The full model value is the product of the surrogate dose (estimated using exposure models), the chemical's toxicity weight, and the population under 10 years of age. The pounds used in this expression of the Indicators differ from the pounds used for **Modeled Pounds*Toxicity*Pop** (and may be a smaller value) because the fate and transport of the chemical pounds have been modeled and exposure assumptions have been made. Also note that **Modeled Pounds * Toxicity * Pop** uses total population only, and is not available for subpopulations.
- **Full Model Children 10 to 17 (Risk-Related).** The full model value is the product of the surrogate dose (estimated using exposure models), the chemical's toxicity weight, and the population from to 17 (inclusive) years of age. The pounds used in this expression of the Indicators differ from the pounds used for **Modeled Pounds*Toxicity*Pop** (and may be a smaller value) because the fate and transport of the chemical pounds have been modeled and exposure assumptions have been made. Also note that **Modeled Pounds * Toxicity * Pop** uses total population only, and is not available for subpopulations.

- **Full Model Males 18 to 44 (Risk-Related).** The full model value is the product of the surrogate dose (estimated using exposure models), the chemical's toxicity weight, and the male population from 18 to 44 (inclusive) years of age. The pounds used in this expression of the Indicators differ from the pounds used for **Modeled Pounds*Toxicity*Pop** (and may be a smaller value) because the fate and transport of the chemical pounds have been modeled and exposure assumptions have been made. Also note that **Modeled Pounds * Toxicity * Pop** uses total population only, and is not available for subpopulations.
- **Full Model Females 18 to 44 (Risk-Related).** The full model value is the product of the surrogate dose (estimated using exposure models), the chemical's toxicity weight, and the female population from 18 to 44 (inclusive) years of age. The pounds used in this expression of the Indicators differ from the pounds used for **Modeled Pounds*Toxicity*Pop** (and may be a smaller value) because the fate and transport of the chemical pounds have been modeled and exposure assumptions have been made. Also note that **Modeled Pounds * Toxicity * Pop** uses total population only, and is not available for subpopulations.
- **Full Model Adults Over 65 (Risk-Related).** The full model value is the product of the surrogate dose (estimated using exposure models), the chemical's toxicity weight, and the population over 65 years of age. The pounds used in this expression of the Indicators differ from the pounds used for **Modeled Pounds*Toxicity*Pop** (and may be a smaller value) because the fate and transport of the chemical pounds have been modeled and exposure assumptions have been made. Also note that **Modeled Pounds * Toxicity * Pop** uses total population only, and is not available for subpopulations.
- **Full Model (Risk-Related).** The full model value is the product of the surrogate dose (estimated using exposure models), the chemical's toxicity weight, and the population. The pounds used in this expression of the Indicators differ from the pounds used for **Modeled Pounds*Toxicity*Pop** (and may be a smaller value) because the fate and transport of the chemical pounds have been modeled and exposure assumptions have been made.

Examples of useful comparisons among the above Indicators include:

1. TRI Pounds vs. TRI Pounds (with toxicity)

   This comparison allows you to determine the proportion of total TRI Pounds released that are associated with chemicals that have toxicity weights. This proportion may be somewhat different than the overall proportion of TRI chemicals that have toxicity weights. For example, 50% of a given set of TRI chemicals may have toxicity weights. However, it is possible that 80% of the TRI Pounds released for the same set of chemicals may be associated with chemicals that have toxicity weights.

2. TRI Pounds vs. Modeled Pounds

   This comparison allows you to determine the proportion of chemical releases for which risk-related impacts can be estimated using the Full Model option.

3. TRI Pounds*Toxicity vs. Modeled Pounds*Toxicity

   This comparison shows you (a) the amount of toxicity-weighted releases associated with chemicals that have toxicity weights versus (b) the amount of toxicity-weighted releases for chemicals that have both toxicity weights and physicochemical data that are used to model exposure. An important difference between this comparison and the comparison in example (2) above is that this comparison addresses only those chemicals that have toxicity weights.

4. Modeled Pounds*Toxicity vs. Modeled Pounds*Toxicity*Pop

   This comparison allows you to determine the extent to which total population contributes to the Indicator value. However, no exposure modeling is considered in this crude approximation.

Within the model, you can only display one type of summary in a custom table at a time. However, if you export the table to another format such as Microsoft Excel or Lotus 1-2-3, you can work with all of the data at once. Simply click on the **Export** button at the top of the screen (see below for details on exporting).

Options

These selections allow you to modify how values are expressed in the table.

• Normalization

For any of the summaries selected except 'TRI Pounds,' you can choose to normalize the Indicators. Click **Options**, then 'Normalization,' then 'National.' The value shown in each cell is that cell's portion of the national value for that year, divided by the total value for 1988 and multiplied by 100,000. In this way, each national summary (i.e., Full Model, Modeled Pounds * Tox) for 1988 is 100,000, and any other selection is displayed as a percentage of that.

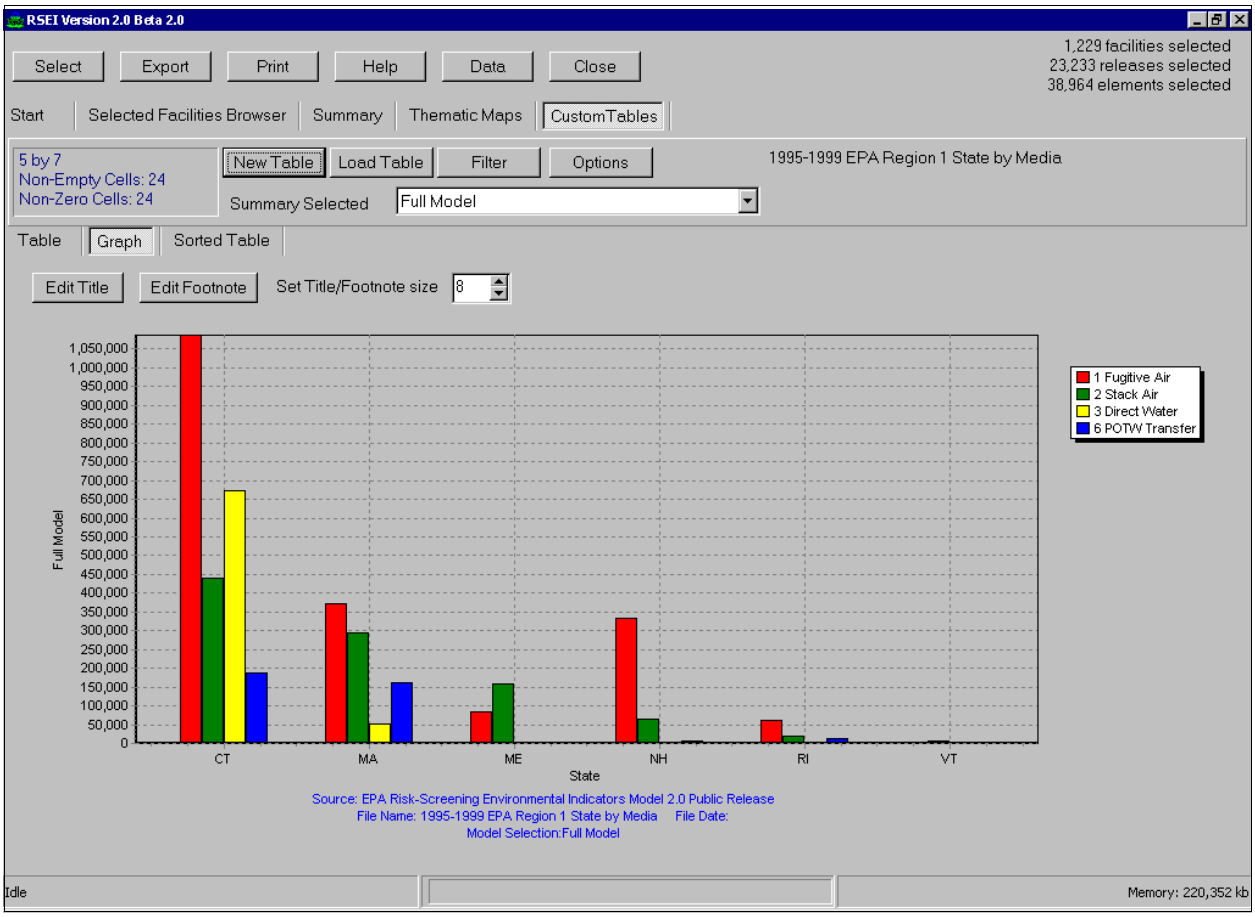
• Cell Display

This option will display additional values in your table (underneath each current cell value) that shows how that cell's value contributes to different portions of the aggregate table value. The default display includes the first three options listed below, Total Percent, Column Percent, and Row Percent. To turn them off, simply click on each one to remove the check mark. Clicking on them again will turn them back on. The box in the upper left corner of the table shows the color of each cell display option.

- **Total Percent.** The percent contribution of the current cell to the total table sum. For instance, if the 'Full Model' summary is selected, a cell's total percent value (shown in red) would be that cell's full model score divided by the sum of all cells. The sum of all the cells in the table is shown in the bottom right corner in black.
- **Row Percent.** The percent contribution of the current cell to the total row sum. If the 'Full Model' summary is selected, a cell's row percent value (shown in green) would be that cell's full model score divided by the sum of all cells in that row, as shown in far right cell in that row, in black.
- **Column Percent.** The percent contribution of the current cell to the total column sum. If the 'Full Model' summary is selected, a cell's total percent value (shown in blue) would be that cells full model score divided by the sum of all cells in the column, as shown in the bottom cell in the column in black.
- **Percentile.** The percentile that the cell's value falls into, when all of the cell values in the table are taken into account.
- **Rank.** The cell's rank, from highest (1) to lowest, of all of the cell values in the table.

Graph

The **Graph** function allows you to quickly create a pre-formatted graph based on the current **Custom Table.** The **Graph** works from your current display, not from the underlying table, so if columns or rows are collapsed, they will not be included. Also, if you have used the filter to select certain values of your variables, the excluded variables will not be shown on the graph. Whatever summary statistic (TRI pounds, Full Model, etc.) is showing will be used. You can go back and forth between the two screens. Anything you change in the **Custom Table** will automatically be updated and displayed in the **Graph**.



Custom Graph

If your table is very large or contains many variables, the model will attempt to graph it, but the graph may not legible. If this is the case, simply collapse rows and/or columns, or use the **Filter** option to reduce the number of values that need to be displayed on the graph.

If you choose to print your graph (using the **Print** button at the top of the screen), you can add a title for it by clicking on the **Edit Title** button above the graph, and typing in the desired text.

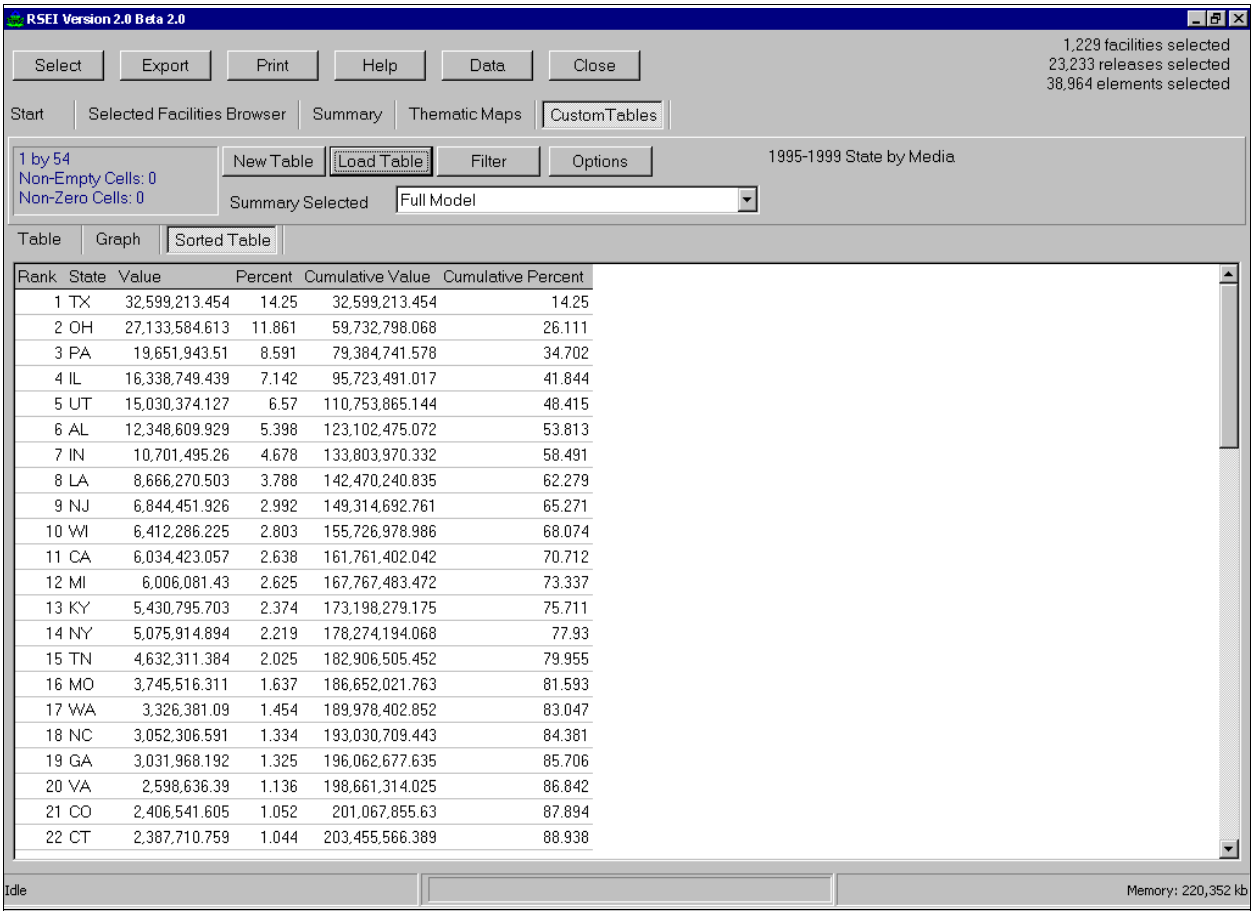
The footnote that will be printed on your **Graph** is shown in blue below the graph. The default footnote shows the RSEI model version number, the file name of your table, and the model selection (summary) that is being graphed. You can change this footnote by clicking the **Edit Footnote** button above the graph, and typing in the desired text.

You can change the font size for both the title and the footnote in the box above the graph.

Sorted Table

The **Sorted Table** option allows you to display your table in the form of a sorted list. Like the **Graph** function, the **Sorted Table** works from whatever you have displayed on the **Custom Table** at the time. Each table cell showing is given one entry in the list, which is sorted in descending order. The value for that statistic (i.e., if it is TRI Pounds it would be the total number of pounds in that cell) is shown in the 'Value' column, and the then that cell's percent of the total is shown in the 'Percent' column. The cumulative values and percents are presented in the next two columns.

The **Sorted Table** is very useful when looking at large complicated tables. It shows very quickly what cells are of most concern, and for how much of the total the top few entries are responsible. If you have a table with several row variables, for instance, you can quickly zoom in on the area of most concern by collapsing the table to one row and one column, and then clicking **Sorted Table** to find which value of the first row or column variable is of most concern. Then you can expand the table and look at a more detailed breakdown for that value.

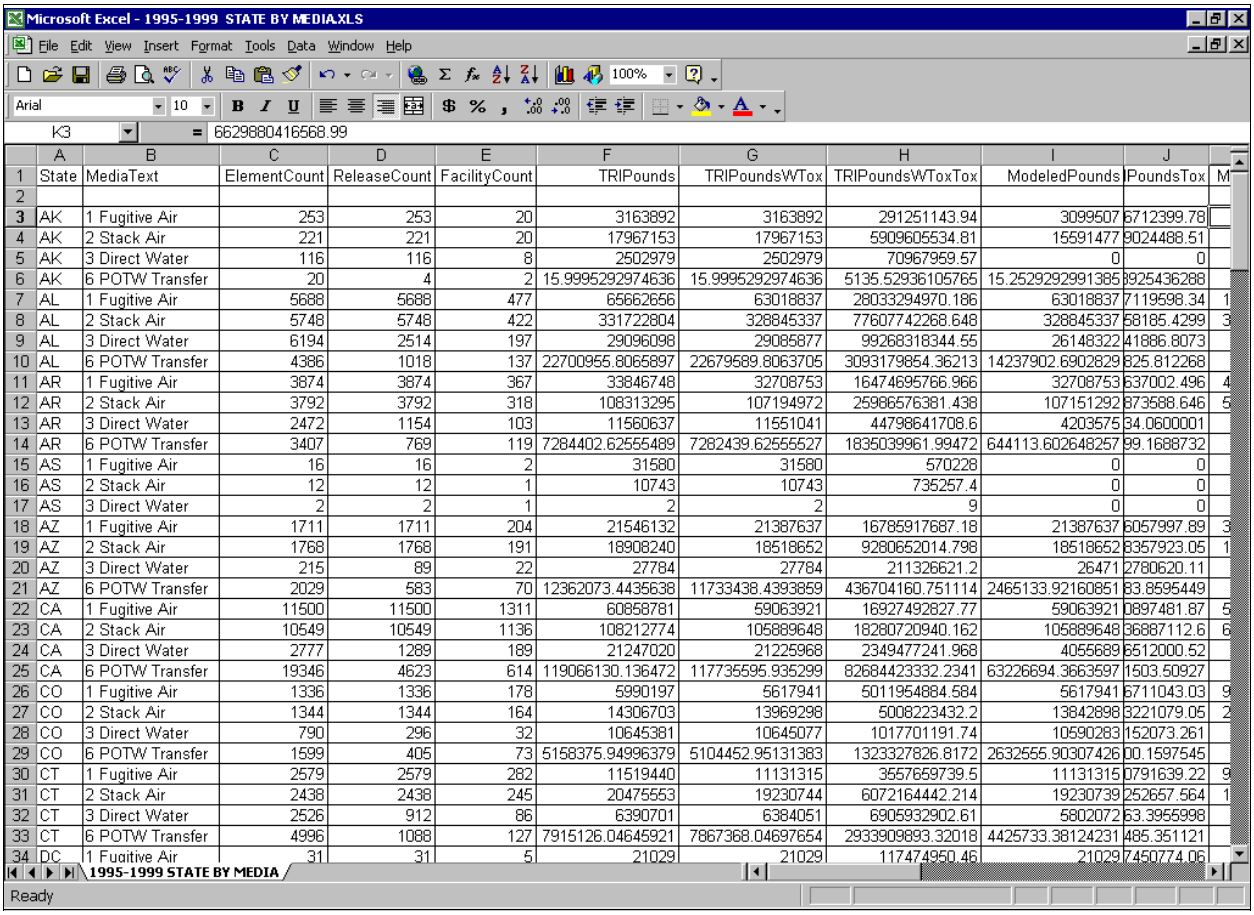


Rank	State	Value	Percent	Cumulative Value	Cumulative Percent
1	TX	32,599,213.454	14.25	32,599,213.454	14.25
2	OH	27,133,584.613	11.861	59,732,798.068	26.111
3	PA	19,651,943.51	8.591	79,384,741.578	34.702
4	IL	16,338,749.439	7.142	95,723,491.017	41.844
5	UT	15,030,374.127	6.57	110,753,865.144	48.415
6	AL	12,348,609.929	5.398	123,102,475.072	53.813
7	IN	10,701,495.26	4.678	133,803,970.332	58.491
8	LA	8,666,270.503	3.788	142,470,240.835	62.279
9	NJ	6,844,451.926	2.992	149,314,692.761	65.271
10	WI	6,412,286.225	2.803	155,726,978.986	68.074
11	CA	6,034,423.057	2.638	161,761,402.042	70.712
12	MI	6,006,081.43	2.625	167,767,483.472	73.337
13	KY	5,430,795.703	2.374	173,198,279.175	75.711
14	NY	5,075,914.894	2.219	178,274,194.068	77.93
15	TN	4,632,311.384	2.025	182,906,505.452	79.955
16	MO	3,745,516.311	1.637	186,652,021.763	81.593
17	WA	3,326,381.09	1.454	189,978,402.852	83.047
18	NC	3,052,306.591	1.334	193,030,709.443	84.381
19	GA	3,031,968.192	1.325	196,062,677.635	85.706
20	VA	2,598,636.39	1.136	198,661,314.025	86.842
21	CO	2,406,541.605	1.052	201,067,855.63	87.894
22	CT	2,387,710.759	1.044	203,455,566.389	88.938

Sorted Table

Exporting Tables

Any table can be exported to a variety of formats, including Dbase, Lotus 1-2-3, Microsoft Excel, and text. Exporting can be very useful for a variety of reasons. One of the most common uses is to be able to compare the different model summaries, as listed above under **Summary Selected**. The advantage in using exported tables is that all of the summaries are visible at the same time, so you can compare them, and make new calculations with them.



Microsoft Excel - 1995-1999 STATE BY MEDIA.XLS

File Edit View Insert Format Tools Data Window Help

Arial 10

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	A	B	C	D	E	F	G	H	I	J	M
1	State	MediaText	ElementCount	ReleaseCount	FacilityCount	TRIPounds	TRIPoundsWTox	TRIPoundsWToxTox	ModeledPounds	PoundsTox	
2											
3	AK	1 Fugitive Air	253	253	20	3163892	3163892	291251143.94	3099507	6712399.78	
4	AK	2 Stack Air	221	221	20	17967153	17967153	5909605534.81	15591477	9024488.51	
5	AK	3 Direct Water	116	116	8	2502979	2502979	70967959.57	0	0	
6	AK	6 POTW Transfer	20	4	2	15.9995292974636	15.9995292974636	5135.52936105765	15.2529292991385	925436288	
7	AL	1 Fugitive Air	5688	5688	477	65662656	63018837	28033294970.186	63018837	7119598.34	1
8	AL	2 Stack Air	5748	5748	422	331722804	328845337	77607742268.648	328845337	58185.4299	3
9	AL	3 Direct Water	6194	2514	197	29096098	29085877	99268318344.55	26148322	41886.8073	
10	AL	6 POTW Transfer	4386	1018	137	22700955.8065897	22679589.8063705	3093179854.36213	14237902.6902829	825.812268	
11	AR	1 Fugitive Air	3874	3874	367	33846748	32708753	16474695766.966	32708753	637002.496	4
12	AR	2 Stack Air	3792	3792	318	108313295	107194972	25986576381.438	107151292	873588.646	5
13	AR	3 Direct Water	2472	1154	103	11560637	11551041	4479864170 8.6	4203575	34.0600001	
14	AR	6 POTW Transfer	3407	769	119	7284402.62555489	7282439.62555527	1835039961.99472	644113.602648257	99.1688732	
15	AS	1 Fugitive Air	16	16	2	31580	31580	570228	0	0	
16	AS	2 Stack Air	12	12	1	10743	10743	735257.4	0	0	
17	AS	3 Direct Water	2	2	1	2	2	9	0	0	
18	AZ	1 Fugitive Air	1711	1711	204	21546132	21387637	16785917687.18	21387637	6057997.89	3
19	AZ	2 Stack Air	1768	1768	191	18908240	18518652	9280652014.798	18518652	8357923.05	1
20	AZ	3 Direct Water	215	89	22	27784	27784	211326621.2	26471	2780620.11	
21	AZ	6 POTW Transfer	2029	583	70	12362073.4435638	11733438.4393859	436704160.751114	2465133.92160851	83.8595449	
22	CA	1 Fugitive Air	11500	11500	1311	60858781	59063921	16927492827.77	59063921	0897481.87	5
23	CA	2 Stack Air	10549	10549	1136	108212774	105889648	18280720940.162	105889648	36887112.6	6
24	CA	3 Direct Water	2777	1289	189	21247020	21225968	2349477241.968	4055689	6512000.52	
25	CA	6 POTW Transfer	19346	4623	614	119066130.136472	117735595.935299	82684423332.2341	63226694.3663597	1503.50927	
26	CO	1 Fugitive Air	1336	1336	178	5990197	5617941	5011954884.584	5617941	6711043.03	9
27	CO	2 Stack Air	1344	1344	164	14306703	13969298	5008223432.2	13842898	3221079.05	2
28	CO	3 Direct Water	790	296	32	10645381	10645077	1017701191.74	10590283	152073.261	
29	CO	6 POTW Transfer	1599	405	73	5158375.94996379	5104452.95131383	1323327826.8172	2632555.90307426	00.1597545	
30	CT	1 Fugitive Air	2579	2579	282	11519440	11131315	3557659739.5	11131315	0791639.22	9
31	CT	2 Stack Air	2438	2438	245	20475553	19230744	6072164442.214	19230739	252657.564	1
32	CT	3 Direct Water	2526	912	86	6390701	6384051	6905932902.61	5802072	63.3955998	
33	CT	6 POTW Transfer	4996	1088	127	7915126.04645921	7867368.04697654	2933909893.32018	4425733.38124231	485.351121	
34	DC	1 Fugitive Air	31	31	5	21029	21029	117474950.46	21029	7450774.06	

1995-1999 STATE BY MEDIA

Ready

Exported Table

To export a table, click on the **Export** button. Select the file type. Depending on what type you select, some options will be grayed out and some will be active. Select the options you would like of the ones that are active. Name the file in the 'Export to file' box, and click the file icon next to the name box to select a directory for your saved file. The C:\Program Files\RSEI\User directory is a convenient place provided to store model output files. Click OK, and the file will be saved in the C:\Program Files\RSEI\User directory.

Note that file names cannot include any of the following characters: forward slash (/), backslash (\), greater-than sign (>), less-than sign (<), asterisk (*), question mark (?), quotation mark ("), pipe symbol (|), colon (:), or semicolon (;). If you attempt to enter any of these characters, the model will not accept it. The screen below shows a crosstab table exported to Excel. Note that all of the summaries are listed (not just the summary shown

on the screen when the table was exported). Unlike other custom table functions, the table export does not change with what is shown on the screen at the time.

Printing Tables

Any table can also be printed. Simply click **Print** on the top menu, and the currently displaying table will print to your installed default printer. Note that large complicated tables may not print well directly from the program. If this is the case, it may be easier to first export the table to a database or spreadsheet program where more formatting is possible, and then print it from that program.

CHAPTER 9
Additional Information

Table 9-1 presents the 2-digit and 3-digit SIC codes and corresponding industries that are required to report their releases to the Toxics Release Inventory. All facilities within 2-digit SIC codes 10-39 are required to report, whereas only selected facilities within SIC codes 10, 12, 49, 51, and 73 are required to report.

Table 9-1. SIC Codes for TRI Facilities

SIC Code	Industry
10*	**Metal Mining**
102	Copper Ores
103	Lead and Zinc Ores
104	Gold and Silver Ores
106	Feroalloy Ores, except Vanadium
108	Metal Mining Services
109	Miscellaneous Metal Ores (limited to 4-digit code #1099)
12*	**Coal Mining**
122	Bituminous Coal and Lignite Mining
123	Anthracite Mining
20	**Food and Kindred Products**
201	Meat Products
202	Dairy Products
203	Canned, Frozen, and Preserved Fruits, Vegetables, and Food Specialties
204	Grain Mill Products
205	Bakery Products
206	Sugar and Confectionery Products
207	Fats and Oils
208	Beverages
209	Miscellaneous Food Preparations and Kindred Products

Table 9-1. SIC Codes for TRI Facilities

SIC Code	Industry
21	**Tobacco Products**
211	Cigarettes
212	Cigars
213	Chewing and Smoking Tobacco and Snuff
214	Tobacco Stemming and Redrying
22	**Textile Mill Products**
221	Broadwoven Fabric Mills, Cotton
222	Broadwoven Fabric Mills, Manmade Fiber and Silk
223	Broadwoven Fabric Mills, Wool (Including Dyeing and Finishing)
224	Narrow Fabric and Other Smallwares Mills: Cotton, Wool, Silk, and Manmade Fiber
225	Knitting Mills
226	Dyeing and Finishing Textiles, Except Wool Fabrics and Knit Goods
227	Carpets and Rugs
228	Yarn and Thread Mills
229	Miscellaneous Textile Goods
23	**Apparel and Other Finished Products Made from Fabrics and Similar Materials**
231	Men's and Boys' Suits, Coats, and Overcoats
232	Men's and Boys' Furnishings, Work Clothing, and Allied Garments
233	Women's, Misses', and Juniors' Outerwear
234	Women's, Misses', Children's, and Infants' Undergarments
235	Hats, Caps, and Millinery
236	Girls', Children's, and Infants' Outerwear
237	Fur Goods
238	Miscellaneous Apparel and Accessories
239	Miscellaneous Fabricated Textile Products

Table 9-1. SIC Codes for TRI Facilities

SIC Code	Industry
24	**Lumber and Wood Products, Except Furniture**
241	Logging
242	Sawmills and Planing Mills
243	Millwork, Veneer, Plywood, and Structural Wood Members
244	Wood Containers
245	Wood Buildings and Mobile Homes
249	Miscellaneous Wood Products
25	**Furniture and Fixtures**
251	Household Furniture
252	Office Furniture
253	Public Building and Related Furniture
254	Partitions, Shelving, Lockers, and Office and Store Fixtures
259	Miscellaneous Furniture and Fixtures
26	**Paper and Allied Products**
261	Pulp Mills
262	Paper Mills
263	Paperboard Mills
265	Paperboard Containers and Boxes
267	Converted Paper and Paperboard Products, Except Containers and Boxes
27	**Printing, Publishing, and Allied Industries**
271	Newspapers: Publishing, or Publishing and Printing
272	Periodicals: Publishing, or Publishing and Printing
273	Books
274	Miscellaneous Publishing
275	Commercial Printing

Table 9-1. SIC Codes for TRI Facilities

SIC Code	Industry
276	Manifold Business Forms
277	Greeting Cards
278	Blankbooks, Looseleaf Binders, and Bookbinding and Related Work
279	Service Industries for the Printing Trade
28	**Chemicals and Allied Products**
281	Industrial Inorganic Chemicals
282	Plastics Materials and Synthetic Resins, Synthetic Rubber, Cellulosic and Other Manmade Fibers, Except Glass
283	Drugs
284	Soap, Detergents, and Cleaning Preparations; Perfumes, Cosmetics, and Other Toilet Preparations
285	Paints, Varnishes, Lacquers, Enamels, and Allied Products
286	Industrial Organic Chemicals
287	Agricultural Chemicals
289	Miscellaneous Chemical Products
29	**Petroleum Refining and Related Industries**
291	Petroleum Refining
295	Asphalt Paving and Roofing Materials
299	Miscellaneous Products of Petroleum and Coal
30	**Rubber and Miscellaneous Plastics Products**
301	Tires and Inner Tubes
302	Rubber and Plastics Footwear
305	Gaskets, Packing, and Sealing Devices and Rubber and Plastics Hose and Belting
306	Fabricated Rubber Products, Not Elsewhere Classified
308	Miscellaneous Plastics Products

Table 9-1. SIC Codes for TRI Facilities

SIC Code	Industry
31	**Leather and Leather Products**
311	Leather Tanning and Finishing
313	Boot and Shoe Cut Stock and Findings
314	Footwear, Except Rubber
315	Leather Gloves and Mittens
316	Luggage
317	Handbags and Other Personal Leather Goods
319	Leather Goods, Not Elsewhere Classified
32	**Stone, Clay, Glass, and Concrete Products**
321	Flat Glass
322	Glass and Glassware, Pressed or Blown
323	Glass Products, Made of Purchased Glass
324	Cement, Hydraulic
325	Structural Clay Products
326	Pottery and Related Products
327	Concrete, Gypsum, and Plaster Products
328	Cut Stone and Stone Products
329	Abrasive, Asbestos, and Miscellaneous Nonmetallic Mineral Products
33	**Primary Metal Industries**
331	Steel Works, Blast Furnaces, and Rolling and Finishing Mills
332	Iron and Steel Foundries
333	Primary Smelting and Refining of Nonferrous Metals
334	Secondary Smelting and Refining of Nonferrous Metals
336	Nonferrous Foundries (Castings)
339	Miscellaneous Primary Metal Products

Table 9-1. SIC Codes for TRI Facilities

SIC Code	Industry
34	**Fabricated Metal Products, Except Machinery and Transportation Equipment**
341	Metal Cans and Shipping Containers
342	Cutlery, Handtools, and General Hardware
343	Heating Equipment, Except Electric and Warm Air; and Plumbing Fixtures
344	Fabricated Structural Metal Products
345	Screw Machine Products, and Bolts, Nuts, Screws, Rivets, and Washers
346	Metal Forgings and Stampings
347	Coating, Engraving, and Allied Services
348	Ordnance and Accessories, Except Vehicles and Guided Missiles
349	Miscellaneous Fabricated Metal Products
35	**Industrial and Commercial Machinery and Computer Equipment**
351	Engines and Turbines
352	Farm and Garden Machinery and Equipment
353	Construction, Mining, and Materials Handling Machinery and Equipment
354	Metalworking Machinery and Equipment
355	Special Industry Machinery, Except Metalworking Machinery
356	General Industrial Machinery and Equipment
357	Computer and Office Equipment
358	Refrigeration and Service Industry Machinery
359	Miscellaneous Industrial and Commercial Machinery and Equipment
36	**Electronic and Other Electrical Equipment and Components, Except Computer Equipment**
361	Electric Transmission and Distribution Equipment
362	Electrical Industrial Apparatus
363	Household Appliances

Table 9-1. SIC Codes for TRI Facilities

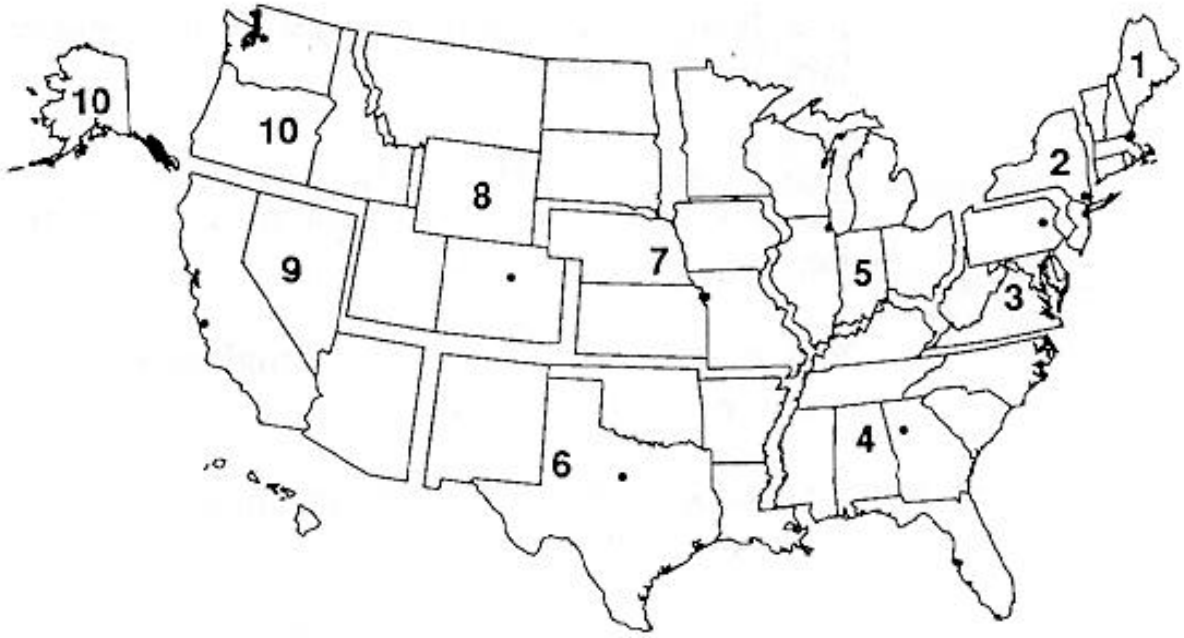
SIC Code	Industry
364	Electric Lighting and Wiring Equipment
365	Household Audio and Video Equipment, and Audio Recordings
366	Communications Equipment
367	Electronic Components and Accessories
369	Miscellaneous Electrical Machinery, Equipment, and Supplies
37	**Transportation Equipment**
371	Motor Vehicles and Motor Vehicle Equipment
372	Aircraft and Parts
373	Ship and Boat Building and Repairing
374	Railroad Equipment
375	Motorcycles, Bicycles, and Parts
376	Guided Missiles and Space Vehicles and Parts
379	Miscellaneous Transportation Equipment
38	**Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks**
381	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical Systems, Instruments, and Equipment
382	Laboratory Apparatus and Analytical, Optical, Measuring, and Controlling Instruments
384	Surgical, Medical, and Dental Instruments and Supplies
385	Ophthalmic Goods
386	Photographic Equipment and Supplies
387	Watches, Clocks, Clockwork Operated Devices, and Parts
39	**Miscellaneous Manufacturing Industries**
391	Jewelry, Silverware, and Plated Ware
393	Musical Instruments

Table 9-1. SIC Codes for TRI Facilities

SIC Code	Industry
394	Dolls, Toys, Games and Sporting and Athletic Goods
395	Pens, Pencils, and Other Artists' Materials
396	Costume Jewelry, Costume Novelties, Buttons, and Miscellaneous Notions, Except Precious Metal
399	Miscellaneous Manufacturing Industries
49*	**Electric, Gas, and Sanitary Services**
491	Electric services (limited to: facilities that combust coal and/or oil to generate electricity for distribution in commerce)
493	Combination Electric and Gas, and Other Utility Services (limited to: 4-digit codes 4931 and 4939, and facilities that combust coal and/or oil to generate electricity for distribution in commerce)
495	Sanitary Services (limited to 4-digit code 4953, and to commercial hazardous waste treatment – facilities regulated under RCRA Subtitle C, 42 U.S.C. Section 6921 et seq.)
51*	**Wholesale Trade-Nondurable Goods**
516	Chemicals and Allied Products (limited to 4-digit code 5169 – products that are not elsewhere classified)
517	Petroleum and Petroleum Products (limited to 4-digit code 5171 – petroleum bulk stations and terminals)
73*	**Business Services**
738	Limited to 4-digit code 7389 – Business Services not elsewhere classified.

*All listed codes in these categories are new as of the 1998 reporting year, except for as noted in the table.

EPA Regions



Region 1	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.
Region 2	New Jersey, New York and the territories of Puerto Rico and the U.S. Virgin Islands.
Region 3	Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and the District of Columbia.
Region 4	Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee.
Region 5	Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin .
Region 6	Arkansas, Louisiana, New Mexico, Oklahoma, and Texas.
Region 7	Iowa, Kansas, Missouri, and Nebraska.
Region 8	Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming
Region 9	Arizona, California, Hawaii, Nevada, and the territories of Guam, Northern Marianis Islands, and American Samoa.
Region 10	Alaska, Idaho, Oregon, and Washington.

Additional Facility Information

The following tables present descriptions of codes used in the model. Table 9-2 presents the environmental media release codes and descriptions of the associated releases. It also lists which codes can be grouped together to represent categories of reporting as identified in the 1997 Public Data Release. (Note that occasionally facilities report releases to media codes that are not listed in the current TRI Form R or in any previous forms. These releases cannot be modeled, but are reported in Indicator runs.) Table 9-3 presents the score category codes which describe details related to the media releases, and whether the release can be modeled using environmental fate and transport models. Table 9-4 presents the maximum onsite and chemical use codes.

Table 9-2. Media Information

Release Code	Description of Release	1997 Public Data Release Category in Which Release is Located
1*	Fugitive Air	Fugitive or Nonpoint Air Emissions
2*	Stack Air	Stack or Point Air Emissions
3*	Direct Water	Surface Water Discharges
6*,**	POTW Transfer	Transfers to POTWs
400	Underground Injection (All Well Classes); this code is used for data reported from 1988 to 1995	Not Applicable
401	Underground Injection (Class 1); this code is used for data reported in 1996 and later years	Underground Injection Class I Wells
402	Underground Injection (Class 2); this code is used for data reported in 1996 and later years	Underground Injection Class II-V Wells
510	Onsite Landfill; this code is used for data reported from 1988 to 1995	Not Applicable
520	Land Treatment/Application/ Farming	On-site Land Releases (Other On-site Land Releases)
530	Surface Impoundment	On-site Land Releases (Other On-site Land Releases)

Table 9-2. Media Information

Release Code	Description of Release	1997 Public Data Release Category in Which Release is Located
540	Other Land Disposal	On-site Land Releases (Other On-site Land Releases)
560	Other Landfills; this code is used for data reported in 1996 and later years	On-site Land Releases (Other On-site Land Releases)
590	RCRA Subtitle C Landfills; this code is used for data reported in 1996 and later years	On-site Land Releases (RCRA Subtitle C Landfills)
710	Offsite Storage Only	Transfers Off-site to Disposal
720	Offsite Recycling (Solvents/Organics Recovery)	Transfers to Recycling
724	Offsite Recycling (Metals Recovery)	Transfers to Recycling
726	Offsite Recycling (Other Reuse or Recovery)	Transfers to Recycling
728	Offsite Recycling (Acid Regeneration)	Transfers to Recycling
740	Offsite Treatment (Solidification/Stabilization)	Transfers to Treatment
741	Solidification/Stabilization- metals and metal compounds only	Transfers Off-site to Disposal
750*	Offsite Incineration/Thermal Treatment	Transfers to Treatment
754*	Offsite Incineration (No fuel value)	Transfers to Treatment
756	Offsite Energy Recovery	Transfers to Energy Recovery
761	Offsite Wastewater Treatment (Excluding POTW)	Transfers to Treatment
762	Wastewater Treatment (Excluding POTW) - metals and metal compounds only	Transfers Off-site to Disposal
769	Offsite Other Waste Treatment	Transfers to Treatment
770	Offsite Landfill	Transfers Off-site to Disposal
771	Offsite Underground Injection	Transfers Off-site to Disposal
772*	Offsite Landfill/Surface Impoundment	Transfers Off-site to Disposal

Table 9-2. Media Information

Release Code	Description of Release	1997 Public Data Release Category in Which Release is Located
773*	Offsite Land Treatment	Transfers Off-site to Disposal
779*	Offsite Other Land Disposal	Transfers Off-site to Disposal
790	Offsite Other Management	Transfers Off-site to Disposal
791	Transfers to Waste Broker; this code is used for data reported from 1988 to 1990	Not Applicable
792	Offsite Transfer to Broker (Energy Recovery)	Transfers to Energy Recovery
793	Offsite Transfer to Broker (Recycling)	Transfers to Recycling
794	Offsite Transfer to Broker (Disposal)	Transfers Off-site to Disposal
795	Offsite Transfer to Broker (Waste Treatment)	Transfers to Treatment
799	Offsite (Unknown Treatment/Disposal)	Transfers Off-site to Disposal

* Indicates that full risk modeling is conducted for these release codes.

** Beginning with the 1991 reporting year, releases to POTWs are coded as 8 in Form R. To allow comparisons with earlier years, however, these releases are still coded as 6 in the RSEI Model.

Table 9-3. Score Category Information

Score Category	Description	If Category is a release, can it be modeled using the environmental fate and transport models?
0	Unknown Error	No
1	Direct Fugitive Air - Rural	Yes
2	Direct Fugitive Air - Urban	Yes
3	Direct Point Air - Rural	Yes
4	Direct Point Air - Urban	Yes
5	Direct Water	Yes
6	Onsite Landfill	No
7	POTW Effluent	Yes
8	POTW Volatilization - Rural	Yes
9	POTW Volatilization - Urban	Yes
10	POTW Sludge Landfill	No
11	POTW Sludge Volat - Rural	Yes
12	POTW Sludge Volatilization - Urban	Yes
13	Offsite Incineration - Rural	Yes
14	Offsite Incineration - Urban	Yes
15	Offsite Landfill	No
16	Offsite Volatilization - Rural	No
17	Offsite Volatilization - Urban	No
18	Offsite treatment other	No
19	Cannot place Lat/Long	No
20	Cannot locate facility stream	No
21	Cannot locate POTW stream	No
22	No/Unmodeled treatment code	No

Table 9-3. Score Category Information

Score Category	Description	If Category is a release, can it be modeled using the environmental fate and transport models?
23	Error in CAS Number	No
24	No Toxicity Data	No
25	No POTW Removal Data	No
28	Reach data is suspect	No
29	Unable to find WBAN	No
30	No Incinerator Efficiency Data	No
31	Floating Point Exception	No
32	Missing Physical-Chemical Data	No
33	Unmodeled - Underground Injection	No
34	Unmodeled - PRD	No
35	Unmodeled - RCRA C Landfill	No
37	POTW Biodegradation	Yes
38	Offsite Incineration Destroyed	Yes
55	Direct Water-Fish Ing. (Rec)	Yes
57	POTW Effluent-Fish Ing. (Rec)	Yes
105	Direct Water-Fish Ing. (Sub)	Yes
107	POTW Effluent-Fish Ing. (Sub)	Yes

Table 9-4. Onsite Chemical Information

Activities and Uses of a Chemical at a Facility	
Category	**Code**
Manufacture (produce or import for on-site use/processing, for sale/distribution, as a byproduct, or as an impurity)	M
Process (as a reactant, as a formulation component, as an article component, or repackaging)	P
Otherwise Use (as a chemical processing aid, as a manufacturing aid, or for ancillary or other use)	OU
Manufacture and Process	M/P
Manufacture and Otherwise Use	M/OU
Process and Otherwise Use	P/OU
Manufacture, Process, and Otherwise Use	M/P/OU
Maximum Amount of a Chemical Onsite at Any Time During the Calendar Year	
Range	**Code**
0 to 99 lbs	01
100 to 999 lbs	02
1,000 to 9,999 lbs	03
10,000 to 99,999 lbs	04
100,000 to 999,999 lbs	05
1,000,000 to 9,999,999 lbs	06
10,000,000 to 49,999,999 lbs	07
50,000,000 to 99,999,999 lbs	08
100,000,000 to 499,999,999 lbs	09
500,000,000 to 999,999,999 lbs	10
1,000,000,000 lbs or more	11

Table 9-5. State Federal Information Processing Standard (FIPS) Codes

Abbreviation	FIPS	State Name
AK	02	Alaska
AL	01	Alabama
AR	05	Arkansas
AS	60	American Samoa
AZ	04	Arizona
CA	06	California
CO	08	Colorado
CT	09	Connecticut
DC	11	District of Columbia
DE	10	Delaware
FL	12	Florida
GA	13	Georgia
GU	66	Guam
HI	15	Hawaii
IA	19	Iowa
ID	16	Idaho
IL	17	Illinois
IN	18	Indiana
KS	20	Kansas
KY	21	Kentucky
LA	22	Louisiana
MA	25	Massachusetts
MD	24	Maryland
ME	23	Maine
MI	26	Michigan
MN	27	Minnesota
MO	29	Missouri
MS	28	Mississippi
MT	30	Montana

Table 9-5. State Federal Information Processing Standard (FIPS) Codes

Abbreviation	FIPS	State Name
NC	37	North Carolina
ND	38	North Dakota
NE	31	Nebraska
NH	33	New Hampshire
NJ	34	New Jersey
NM	35	New Mexico
NV	32	Nevada
NY	36	New York
OH	39	Ohio
OK	40	Oklahoma
OR	41	Oregon
PA	42	Pennsylvania
PR	72	Puerto Rico
RI	44	Rhode Island
SC	45	South Carolina
SD	46	South Dakota
TN	47	Tennessee
TX	48	Texas
UT	49	Utah
VA	51	Virginia
VI	78	Virgin Islands
VT	50	Vermont
WA	53	Washington
WI	55	Wisconsin
WV	54	West Virginia
WY	56	Wyoming

Glossary of Commonly Used Terms

Chronic Human Health Indicator

This is the only Indicator that is operating in the current version of the RSEI model; future versions of the model will address ecological effects and acute effects. This Indicator addresses both chronic effects and chronic exposures related to human health. Chronic effects are those that generally persist over a long period of time whether or not they occur immediately after exposure or are delayed. Chronic exposure refers to multiple exposures occurring over an extended period of time, or a significant fraction of an individual's lifetime.

exposed population

The exposed population is the population that is likely to come in contact with a chemical. The population differs depending on the exposure pathway modeled. For instance, the population exposed to chemicals released to groundwater is the population that obtains their drinking water from groundwater sources, whereas the population exposed to chemicals that are released to air are those within a 21 km by 21 km grid surrounding the facility.

exposure pathway

The exposure pathway is the physical course that a chemical takes from the chemical source to the exposed individual and is related to the type of release. Pathways modeled by the Indicator include air from a facility stack, fugitive air releases, air emitted from a larger area (e.g., an outdoor disposal site), surface water, and groundwater.

exposure route

The exposure route is the way a chemical enters an individual after contact. The RSEI model considers exposure by ingestion and inhalation, but does not address dermal absorption.

Indicator Element

The building block of the RSEI model. A chemical release that is specific to a pathway of exposure (e.g., fish consumption or drinking water). Each Indicator Element has a Score associated with it. If the element cannot be modeled, then the score is zero.

Indicator Value

This value, also called a risk score, is calculated by summing some or all Indicator Elements for one or more years of reported chemical releases and transfers.

normalization

In the RSEI model, it is possible to express the Indicator Values, Subindicator Values, and Indicator Elements normalized to 1988, the first year of data collected by TRI. Reported TRI pounds cannot be normalized.

Subindicator Value

This value is similar to the Indicator Value but is calculated using a subset of Indicator Elements. For example, a Subindicator may be calculated by summing all facility and media-specific scores for one given chemical.

surrogate dose

This chemical-, media-, and facility-specific dose to an individual is calculated in several steps. First, exposure pathway-specific chemical release volumes are combined with physicochemical properties and site-specific characteristics in models to estimate an ambient concentration in the environmental medium of concern. The ambient media concentration is then combined with standard human exposure assumptions (for adults and children) to estimate the magnitude of the dose.

toxicity weight

This weight is a proportional numerical weight applied to a chemical based on its toxicity. The toxicity of a chemical is assessed using EPA-established standard methodologies. For each exposure route, chemicals are weighted based on their single, most sensitive adverse chronic human health effect (cancer or the most sensitive noncancer effect). The range of toxicity weights differs depending on whether the chemical is a carcinogen or a noncarcinogen: the range is approximately 0.1 to 1,000,000 for carcinogens and approximately 0.001 to 100,000 for noncarcinogens.

[*Additional facility-, chemical-, toxicity-, and exposure-specific terms are defined in chapters that describe the computer operations.****]***